The Dock and Harbour Authority

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Editorial Comments

1939 A.D. and 1940 A.D.

Like the year 1914, the year 1939 will be an outstanding date in European history. Both have been years of world crises, but, whereas in the former case, the outbreak of war came with the suddenness of a thunderclap, in the latter there has been a gradual intensification of fear and apprehension while international relations became more and more strained, until, at last, the breaking point was reached.

International politics naturally exercise a very potent influence over port affairs, and this was manifest in 1939, even in the initial stages of antagonistic developments. The useful record of the year, therefore, as regards port improvements and extension works has been appreciably curtailed, not only by the four months of open hostilities, but also during the prolonged anticipatory period in which trouble was brewing. Port authorities have naturally been reluctant to embark on fresh development schemes, not knowing what the situation might be before they were completed, nor how profoundly shipping movements might be affected in the interval.

Moreover, ever since the preliminary crisis of September, 1938, their attention had been diverted under pressure from government and administrative headquarters to the necessity of taking adequate protective measures in anticipation of probable and sudden air raids on shipping while in port, and on dock and harbour premises and machinery. Much expenditure was incurred in, and a considerable amount of time and energy devoted to, the provision of appliances and equipment which had little association with peace-time operations at the quayside. The capital sums thus diverted from purposes more appropriate to normal port requirements have aggregated a very large amount. To take one case alone, the Port of London Authority laid out a quarter-of-a-million sterling on the provision of trenches to afford protection for 30,000 dock workers against blast and splinters in air attacks. In addition, some 5,000 members of the staff were specially trained for emergency work, and much time was absorbed in the perfecting of organisations for rescue work and fire fighting. An elaborate river emergency service was formed, comprising some 69 craft of all kinds, with a staff of doctors, nurses, wardens and other helpers. All these extensive preparations naturally required a great deal of study and attention, so that in other directions there had to be a slackening of effort.

With the actual outbreak of war came a definite halt. All work, other than that required for national defence purposes, and the prosecution of hostilities, was arrested, with the further exception of certain constructional undertakings which, having reached an advanced stage, it was considered desirable to carry on to a conclusion. Generally speaking, programmes of port development were abandoned, or suspended " for the duration," and there is little likelihood of a resumption of activities until the return of settled times.

The outlook for 1940 cannot be considered very bright. The paralysis of national enterprise must continue for the present, though since it is generally " the unexpected that happens," the country entertains, optimistically though cautiously, the hope that the end may arrive sooner than at present seems likely. Meanwhile, it is the duty of everyone to be of good courage and to keep a stout heart. In this spirit of cheery hopefulness we wish all our readers " A Happy New Year."

The Record of 1939.

It can scarcely be claimed that there have been any events of outstanding importance in port affairs during the year which has just closed. Everything has been overshadowed by the national emergency. One or two incidents, however, are worth recalling.

In the first place, there was the centenary of the inception of the Cardiff dock system, which was commemorated in a quiet and unassuming way in September. In place of the elaborate programme of civic ceremonial worthy of the occasion, which had been drawn up before the war, there had to be substituted a simple gathering of an almost private character for the unveiling by the Lord Mayor of Cardiff of a mural tablet. Despite its lack of imposing formality, the meeting was impressive and served to emphasise the significance of the event which started Cardiff on its flourishing career as a port for the industries and mineral output of South Wales, with shipping services to all parts of the globe.

Then, in the previous month, there had been the arrival of the new " Mauretania " for the first time at her home port of London, an incident which aroused a considerable degree of interest and enthusiasm, both local and general. Although not the largest of ocean leviathans, the " Mauritania " is of notable calibre and will enhance the reputation of the port to which she belongs.

The Albert Canal was to have been opened in the late summer with due pomp and circumstance, but an unfortunate mishap delayed completion of the work. Up to the outbreak of the war, the official opening had not taken place, and Belgian national rejoicings have had to be postponed to the general regret of neighbouring countries as well as of the Belgian people.

The Port of Rangoon.

The improvements recently carried out at Brooking Street Wharf, Rangoon, described in the present issue, emphasise the growing importance of the seaborne trade of the capital city and chief port of Burmah. The Rangoon river has already, in our issues of September and October last, received a considerable degree of notice in regard to the treatment under consideration for the maintenance and improvement of the port approach channel. The present article deals with the port itself, its quayside development and the amplification of facilities for handling cargoes in and out of the port.

Despite its paramount standing as the leading gateway to the interior of Burmah and the neighbouring States of Siam and Assam, and particularly under present circumstances, arising out of the blockade by Japan of ports on the China Sea, to Central China, Rangoon is by no means an old-established trading centre. The foundation of the town dates only from the middle of the 18th Century, when it was built by Aloung-bhoom. the founder of the Burmese monarchy, which ultimately succumbed to British supremacy and was annexed after successive captures of the city in 1824 and 1852.

By reason of its location on the left bank of the Rangoon River, the eastern branch of the Irrawaddy, with which it is connected by Panhlaing and Bassein Creeks, Rangoon commands the bulk of the commerce over 1,200 miles in the interior of the country, and as it is also the terminus of the Burmese Railway system, it enjoys exceptionally favourable conditions for the development of its trade. The staple export is rice and its

Editorial Comments— continued

derivatives, of which nearly two million tons are despatched annually, and during the busy season, from the end of December to the middle of May, the river in front of the town is crowded with craft. In addition to rice, teak and Burmese timber are important exports, as also mineral oils and the products of ore refining. Port labour is mainly performed by immigrant Indians.

Canal Transport in War Time.

The neglect of British canals has been a source of criticism and complaint of many years past, and despite favourable judgments by successive Commissions on the scope of canal utility, nothing of any serious importance has been done to modernise the existing system as a whole, in order to meet the conditions of present-day transport. It has been urged, time and again, in this Journal as in others, that the British nation should consider the example set by Germany, Belgium, Holland and other Continental countries, which have expanded and developed their inland waterways to serve a large and growing traffic.

Now the war has come, and roads and railways have become congested under the pressure of goods awaiting transport. We publish in this issue an article from an authoritative source reiterating the advantages which would accrue from a more systematic and fuller use of the canals, to distribute overseas goods now arriving in British ports in considerable and concentrated volume under the convoy system.

In addition, there will be found in our Correspondence Column, a timely and impressive communication from The Canal Joint Committee.

It would seem that the attention of the Government has, at last, been arrested, and that some measures may be taken to remedy the position. The Minister of Transport in his address to the Institute of Transport on December 11th plainly alluded to the recent formation of the Canal (Defence) Advisory Committee, which is composed of canal owners, canal carriers, and Government Departments directly interested in canal transport. It is too much to hope that this body may be able to function adequately? Properly supported in official quarters, it should be capable of infusing fresh life into what has hitherto been regarded as almost a defunct industry, but which only needs energetic exploitation in order to make it a valuable agency in the public service, especially under war-time conditions.

Traffic Diversion at East Coast Ports.

Fears have not unnaturally been entertained by authorities at ports on the East Coast that the projected diversion of shipping traffic to less vulnerable zones might, if carried out too drastically, injuriously affect their interests. The apprehension is not one to be lightly dismissed and the likelihood of numerous transfers was increased by the indiscriminate laying of mines by the German Naval Command on the traffic routes in the North Sea and in the approaches to East Coast Ports. The German wireless, with premature jubilation, went so far as to announce that the Port of London had been closed—in the sense that it was no longer accessible. The " closure," however, was merely a temporary hold-up of traffic while the estuary was swept clear of mines, and subsequent reports have confirmed the regular operation of the port, subject, of course, to war-time regulations.

Among other anxious bodies, the Chamber of Commerce and Shipping at Hull have taken action by communicating a resolution on the matter to the Ministers of Shipping and Transport. In another column will be found the replies which were received. Bearing in mind the importance of their trade to the ports concerned, there is every reason to believe that no interference will be authorised without the fullest justification on account of national needs, and to this proviso, in the last resort, everybody must bow.

Finnish Ports.

The outbreak of hostilities in North-Eastern Europe has brought into prominence a number of ports on the Finnish seaboard with which the generality of people in this country have not hitherto been closely acquainted. Helsinki (or, to give its older designation, Helsingfors) is perhaps fairly well known as the capital of Finland, and our readers will readily recall the article on the port which was published in our issue of August, 1937. Less familiar, to others than traders with interests in the Baltic, will be Abo (Turku) Bjorneborg, Uleaborg, Wiborg and Vasa. But the least known is the relatively modern port of Petsamo on the coastline of the Barents Sea, which has the advantage of possessing an ice-free harbour, with unimpeded access to the open ocean. It is with the view of depriving Finland of this convenient channel of communication with the outer world that Russia has concentrated her attacks upon it.

In an article recently contributed to " The Daily Telegraph," Capt. R. S. Gwatkin-Williams describes Petsamo as a landlocked, natural harbour, with sufficient, but not too deep water, and gently shelving sandy beaches. In the centre of the fairway there is a submerged rock, which used to be marked by a Trinity House light-buoy. The entrance to the harbour lies between black, beetling cliffs, " whose blackness is irradiated by a thousand cascades, and glitters with veins of mica and rosy-hued iron ores." Having passed the submerged obstacle, the precipitous rocks give way to a beautiful lagoon, at the head of which is the Trifona River.

"Petsamo" continues Capt. Gwatkin-Williams, " is something like a Finnish Danzig in the present struggle. It is connected to its motherland only by a narrow corridor. In peace-time it is of no value to Russia. It has no road or rail connections, and is served merely by a few rough tracks. Russia has many other Arctic ports besides Murmansk and Archangel, and these are served by rail. But should Russia be at war with Germany, or any great sea power, Petsamo could easily be converted into a second Gibraltar, holding the key to Murmansk and all the trade of the White Sea. The harbour cannot be bombarded from the sea; it is immune from mines and submarine attack and, with a neutral Norway to the west and no roads, it would be easily defensible against land attack."

Finland is a country appreciably larger than the British Isles, but one-third of its area (over one-half is stated in one book of reference) is taken up with forests, and another 10 per cent. or more by lakes, so that the productive region is very circumscribed, quite apart from the disabilities imposed by a rigorous climate in districts of irregular elevation. Timber and timber products (pulp, paper, plywood, etc.), are the main exports, while imports include provisions, colonial produce and coal and coke. Attention was drawn in the article on Helsinki to the growing volume of imports of coal and coke, which are supplanting wood as fuel.

The warmest sympathy is being extended by all the civilised states of the world to Finland in the unwarranted attack on her liberty. " Civilised " is written advisedly, for the two aggressive dictatorship countries by their hideous misdeeds have put themselves outside the pale of civilisation. The treatment meted out to Helsinki, like the parallel case of Warsaw, is particularly abhorent, and scenes recently enacted in the now devastated capital would have seemed incredible and were certainly beyond anticipation when, three years ago, we were passing through its modern streets with their new and handsome buildings.

The Responsibilities of Port Authorities.

In a Paper read before the Pacific Coast Association of Port Authorities and published in this issue, Mr. Joseph F. Marias, President of the Board of State Harbour Commissioners at San Francisco, directs attention to certain duties and responsibilities, the discharge of which by port authorities he considers to be of the first order of importance. Although written for an American audience, there is much in the Paper which can give rise to thoughtful reflection in English circles.

Primarily, he emphasises, with every justification, the responsibility of a port towards its hinterland. The port, indeed, is in a very real sense, the servant of the hinterland, and the requirements of the latter, both as regards the assemblage of its exports and the distribution of its imports, should be adequately met. It is the first duty of a port manager to acquaint himself with the nature and extent of the hinterland which he serves, for it is by no means confined within the limits of a small circle drawn round the port as a centre. Hinterlands are as varied in outline as they are in character, and the more the hinterland is studied, alike as regards its needs and its output, the more effective will be the service rendered by the port.

Mr. Marias would abolish competition between ports and, no doubt, in an ideal community the absence of competition might lead to certain economies in operation. The subject, however, is controversial. Without healthy competition, ports, like all other business undertakings, tend under normal conditions to lose their initiative and enterprise. Public services monopolies are not, generally speaking, conspicuously successful or desirable, at any rate without definite safeguards.

Other topics raised by Mr. Marias, relate to the cost of distribution and port finance and they will meet with greater or less acquiescence according to the point of view of the reader, but the whole Paper is worthy of careful perusal.

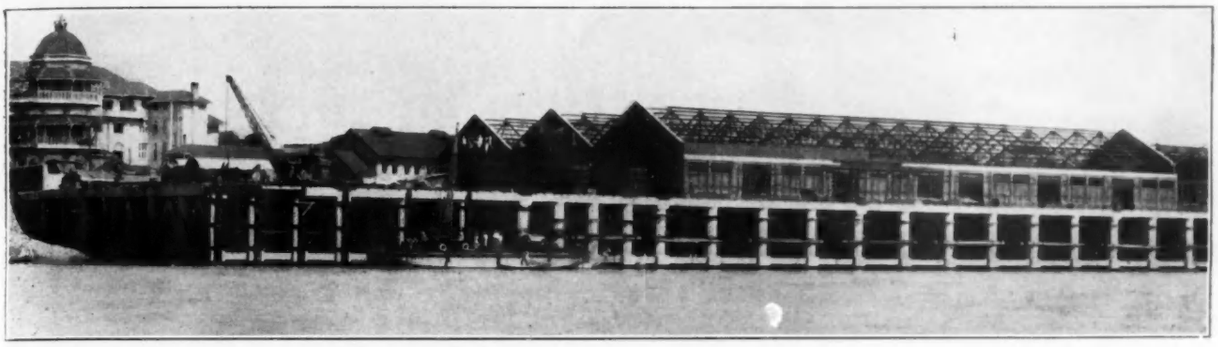
Progress at the Port of Beira.

In an article on The Port of Beira in the issue of this Journal for July last, a brief reference was made to impending dredging operations in the entrance channels for the purpose of securing sufficient depth on any high tide for vessels drawing 28-ft. of water. A contract was placed in that month with the Nash Dredging and Reclamation Co., Ltd., Westminster, London, and a dredger has since arrived at Beira, some delay having been occasioned by war conditions. The work is expected to commence immediately.

The new wharves, with the attendant reclamation work and the erection of transit sheds, is well forward and should be completed in a few months' time.

Improvements at the Port of Rangoon

An Account of Recent Extensions



View from River of West End of Brooking Street Wharf.

General Description

RANGOON, which has a population of a little over 400,000, is the capital and chief commercial port of Burma. It is situated on the Hlaing or Rangoon River, about 20 miles from its entrance into the Gulf of Martaban, and just above its confluence with the Pazundaung Creek and Pegu River. The Rangoon River is an eastern branch of the Irrawaddy River, which extends for more than 1,200 miles into the interior. At Rangoon the river is some 800 yds. wide, and the foreshore of the harbour extends over 7,200 yds., of which about two-thirds have been developed for port shipping purposes. The inner harbour has a maximum tidal range of about 22-ft., and a depth of 21-ft. at low water. Access to the Harbour requires to be maintained by dredging. The depth of water on the bar is 28-ft. at H.W.O.N.T. and 34-ft. at H.W.O.S.T.

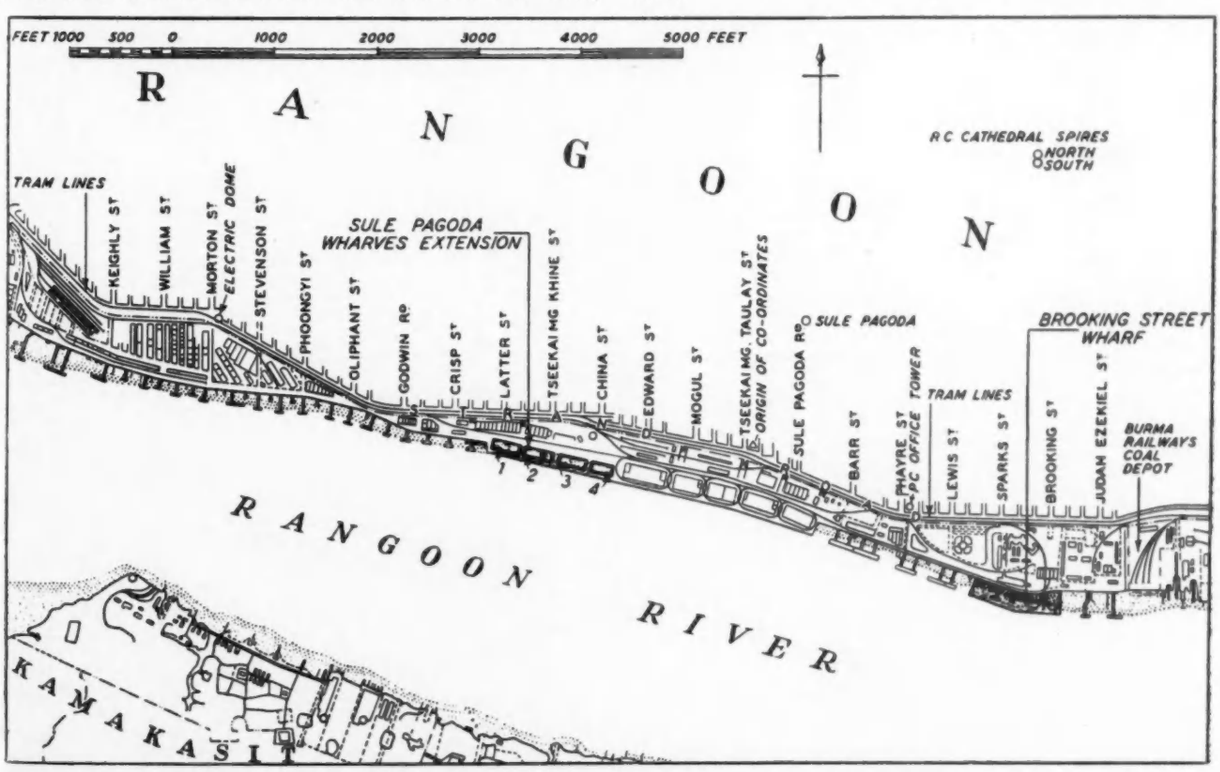
Port Development

Rangoon now handles over 90% of the total overseas trade of Burma, and in order to deal adequately with the steadily growing volume of goods and traffic passing through the port, the necessity of increasing and modernising the wharfage accommodation has been under consideration for a number of years past, and a comprehensive programme of port development, estimated to cost about £2,000,000, was adopted in 1925. Apart from certain reclamation and development works, the first stage of the scheme was the construction of the Strand Market Wharf, 509-ft. long and 40-ft. wide. This wharf, which joined up the former Sule Pagoda and Latter Street Wharves, was completed in 1930, and was described in detail in the May 1930 issue of this Journal. It is constructed of reinforced concrete, the front portion being carried on two rows of reinforced concrete cylinders of the bell-mouthed type, 7-ft. in diameter, with bases 10-ft. in diameter, the superstructure having a deck of ordinary beam and slab construction laid on shuttering. The back area of the wharf is carried on 75-ft. piles, and has a concrete deck and modern transit sheds.

Brooking Street Wharf

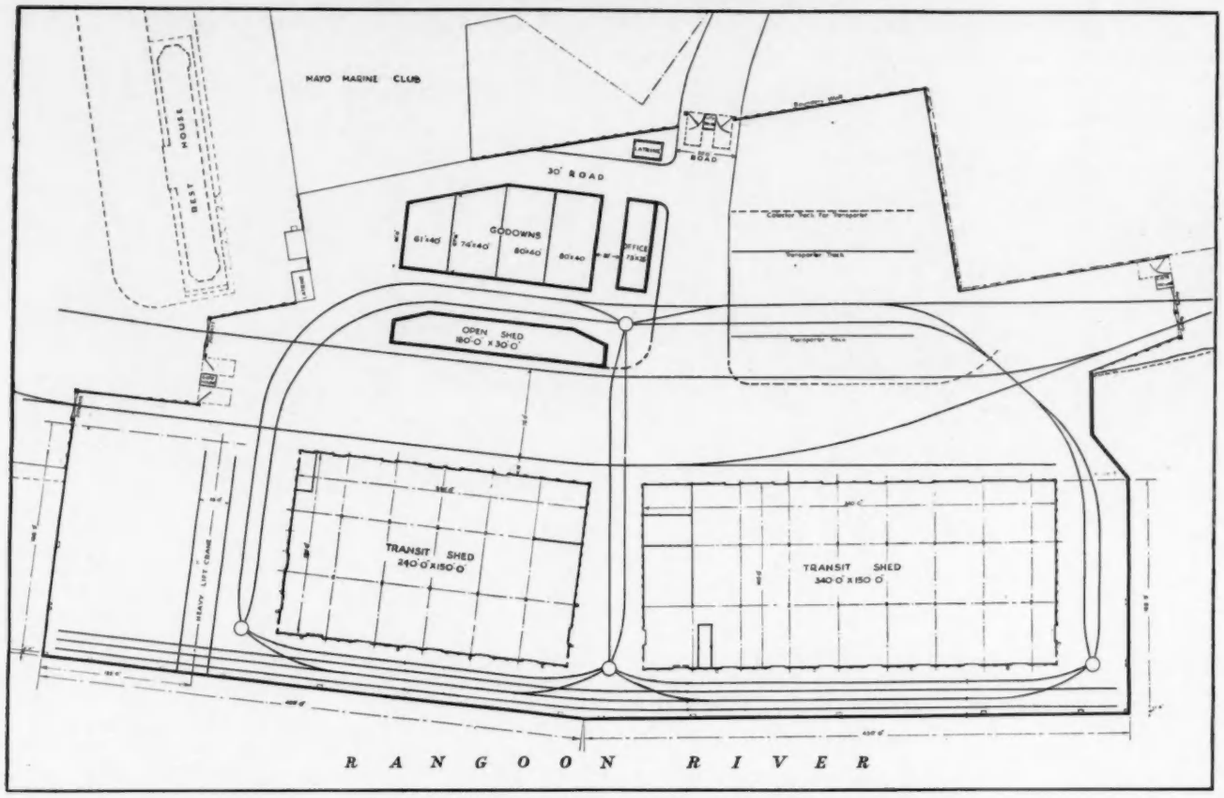
The completion of the Strand Market Wharf marked a definite stage in the Port Commissioners' programme of Port development and reconstruction, and the succeeding years of economic depression led to a postponement of major works, though a further step forward was achieved by the construction, in 1933, of the deep-water pontoon berth for sea-going vessels at Barr Street; this berth was subsequently equipped to form the Port Health Station, and was opened by His Excellency Sir Archibald Cochrane, G.C.M.G., K.C.S.I., D.S.O., Governor of Burma, on 3rd February, 1937.

In October, 1934, the Commissioners decided to proceed with the construction of a new two-berth wharf at Brooking Street, to replace the old screw-pile jetty built in 1882, and the Chief Engineer was instructed to prepare plans and estimates for the work.



Plan of Portion of the Port of Rangoon, showing the site of wharves which have been, and are being, extended and modernised.

Improvements at the Port of Rangoon—continued



Brooking Street Wharf. General Plan of New Lay-out.

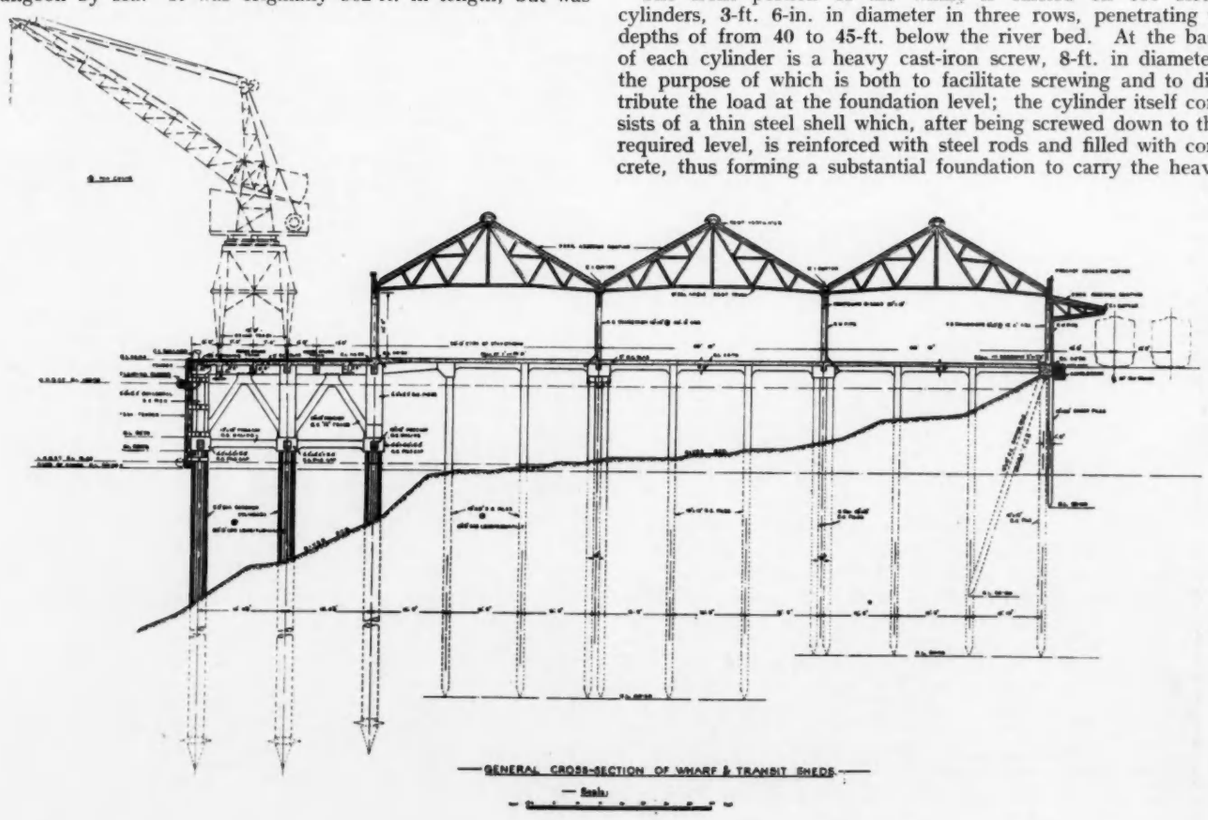
The preliminary investigation of the site included an extensive series of borings to ascertain the nature of the soil below the river bed. Three screw cylinders were put down as a trial, and were subjected to load tests. The design adopted for the wharf was based on the information derived from these investigations, and, following discussions with the Commissioners' Consulting Engineers, Sir Alexander Gibb & Partners, Westminster, to whom the proposals were submitted for approval, and to whose assistance and collaboration the Commissioners are indebted, a detailed scheme was approved and the plans and estimates sanctioned on 5th May, 1937.

The old wharf provided only a single berth. With its sheer-legs, it formed a familiar landmark to passengers arriving in Rangoon by sea. It was originally 362-ft. in length, but was subsequently reduced to 276-ft., and when, after being 55 years in commission, it was dismantled in 1937, it had reached the end of its economic life.

The new wharf, which covers the site both of the old Brooking Street Wharf and of the former jetty at Sparks Street, is 900-ft. in length, and the wharf structure proper has an average width of 190-ft. It provides two berths, each 450-ft. long, capable of accommodating the largest types of sea-going vessels normally using the port. The wharf is constructed throughout in reinforced concrete. A minimum depth of 25-ft. is available at low water.

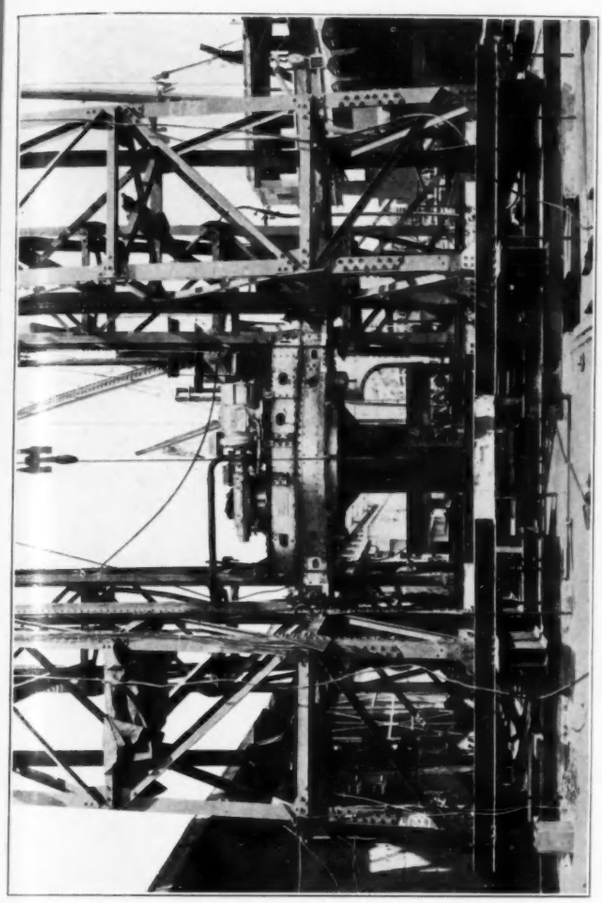
Screw Cylinders

The front portion of the wharf is carried on 150 screw cylinders, 3-ft. 6-in. in diameter in three rows, penetrating to depths of from 40 to 45-ft. below the river bed. At the base of each cylinder is a heavy cast-iron screw, 8-ft. in diameter, the purpose of which is both to facilitate screwing and to distribute the load at the foundation level; the cylinder itself consists of a thin steel shell which, after being screwed down to the required level, is reinforced with steel rods and filled with concrete, thus forming a substantial foundation to carry the heavy

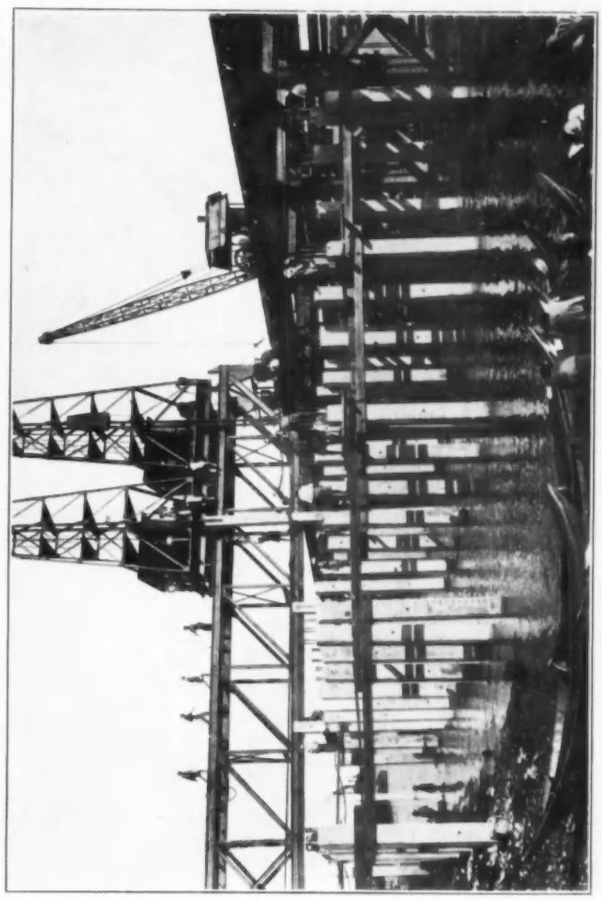


GENERAL CROSS-SECTION OF WHARF & TRANSIT SHEDS

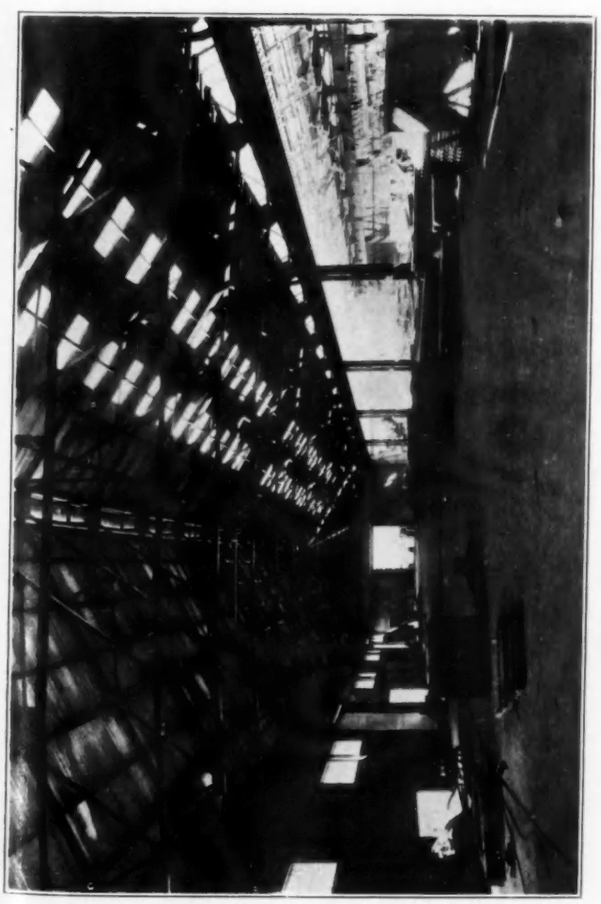
Improvements at the Port of Rangoon



Sule Pagoda—Test Cylinder No. 3.



View of Travelling Bridge at Brooking Street Wharf, carrying two piling frames. The same equipment was used at Strand Market Wharf during 1930.



Interior view of West Transit Shed, Brooking Street Wharf.

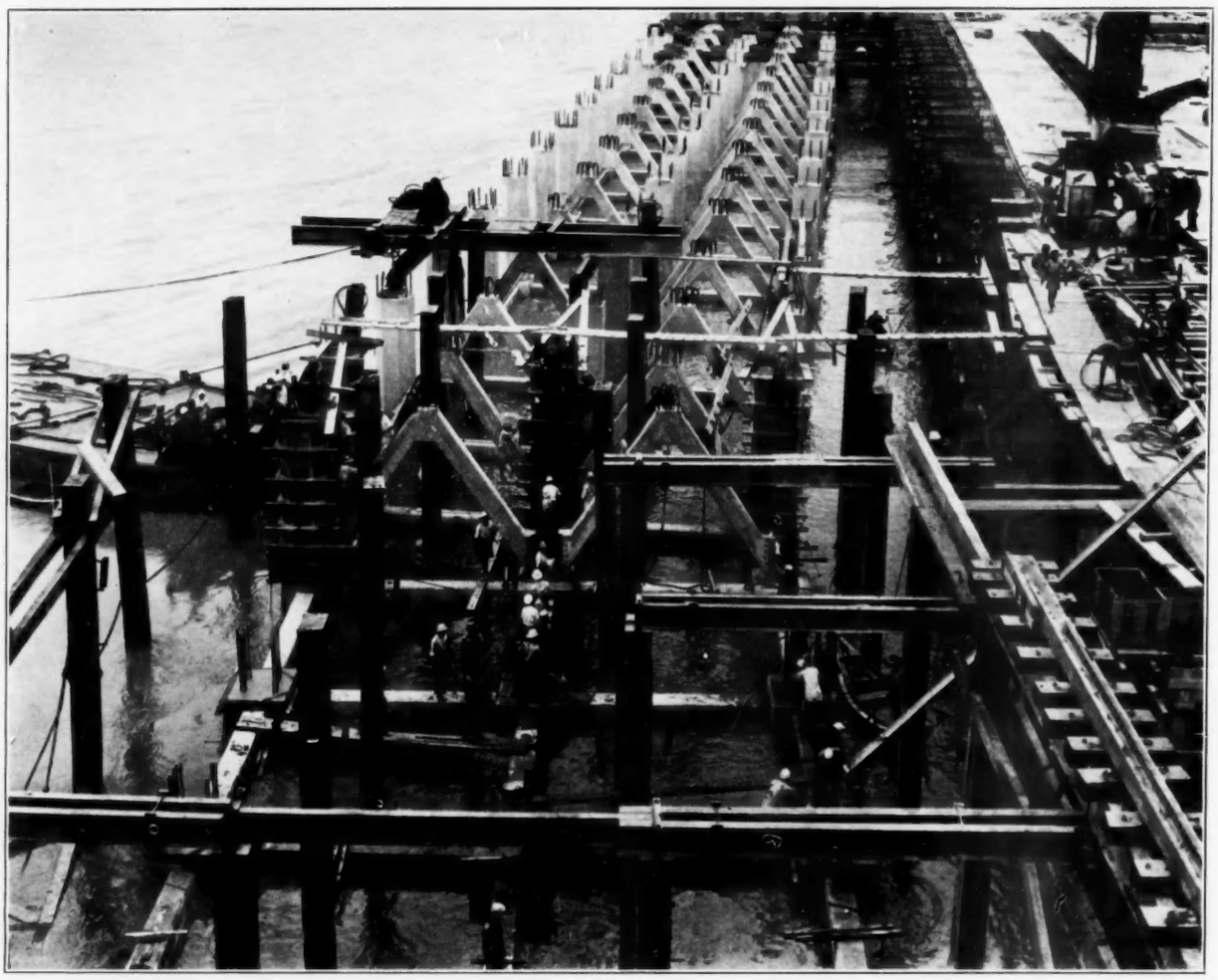
General view of Brooking Street Wharf during construction.

Improvements at the Port of Rangoon—continued

wharf superstructure. The maximum load to which each screw-pile is subjected is 230 tons. Test cylinders were driven and loaded to this degree, and showed that the foundations were entirely suitable to take the load. The supply and putting down of these cylinders was carried out by the Braithwaite, Burn and Jessop Construction Company, Limited, and it is of interest to note that this is the first occasion on which screw cylinders of this type have been used for wharf construction. The heavy gantry and equipment for the screwing of these cylinders travelled on a substantial temporary piled staging which was constructed departmentally.

Reinforced Concrete Piles

The remainder of the wharf, including the area occupied by the Transit Sheds, is supported on 925 reinforced concrete piles, 18-in. by 18-in., varying in length from 50 to 75-ft. The piles



View of front portion of Brooking Street Wharf showing pre-cast "A" frames being placed on "screwcrete" cylinders.

were driven by a bridge carrying two piling cranes, the same apparatus as was used for driving the piles of the Strand Market Wharf in 1930. Some idea of the quantity of materials required for the construction of a work of this nature may be gained from the fact that if these piles were placed end to end they would extend a distance of 10½ miles.

The piles were fabricated and driven departmentally, the whole of the pile-driving being carried out between September, 1937, and February, 1938. The superstructure carried by both the piles and cylinders was also constructed departmentally.

The stone used in the construction of the wharf was granite supplied by Messrs. Osman Mustikhan and Company, and brought by rail from their quarries at Mokpalin.

Satisfactory sand was obtained from Kyatkon; the contractors were Ahmed Khan and S. Mudaliar.

Rapid hardening cement from England was used for the reinforced concrete work.

Transit Sheds

The wharf carries two single-storied transit sheds, that at the West berth being 240-ft. in length, with a floor area of 36,000 sq. ft., and that at the East berth 340-ft. in length, with a floor area of 51,000 sq. ft. Both these sheds are 150-ft. wide, the roofs being in three spans of 50-ft. The sheds are of steel frame construction, with masonry walls; the roof is of asbestos cement sheets, with glazed panels providing ample lighting along the north slope of each bay. Continuous roof ventilation is provided, and additional ventilation is furnished along the north wall, where external canopies give weather protection to vehicles loading cargo from the sheds. The doors are of the roller-shutter type.

Wharf Cranes and Lifting Appliances

The crane equipment on the wharf-head consists of eight 1½-ton portal electric cranes travelling on a track of 15′0″ gauge. Four cranes are provided for each berth. The cables supplying power to the cranes are laid in a pipe conduit below the decking, plug-boxes being provided at intervals for the crane connections; these consist of trailing cables which, when not in use, will be coiled on drums on the cranes.

At the West berth, a travelling portal electric crane of 40 tons capacity is being provided. The crane will travel on a track of 25′0″ gauge at right angles to the face of the wharf, enabling heavy loads to be lifted from a vessel's hold and transferred direct either to road vehicles or to wagons on the railway track at the north side of the transit sheds. The weight of this crane is 360 tons without load, or 400 tons when carrying its maximum lift, and the portion of the wharf on which it will travel has been specially designed to carry this heavy load.

Both the 1½-ton cranes and the 40-ton crane have been specially built for the Commissioners by Messrs. Stothert and Pitt, Limited.

A 10-ton electric transporter crane is provided behind the east transit shed to facilitate the handling of cargo to be stacked in the open. This crane can serve both the trolley-lines and railway sidings.

Rail Facilities

On the wharf-head a system of trolley-lines and turntables is provided, connecting with the layout of trolley-lines and sidings in the yard area.

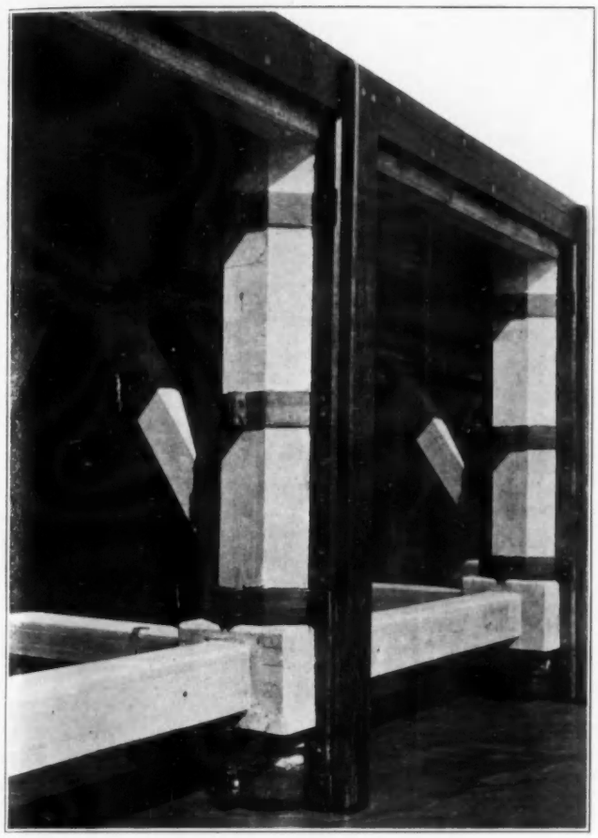
Railway sidings are provided in the yard area, connecting with the Burma Railways' Suburban Line on the west at Phayre Street, and on the east near Judah Ezekiel Street. There is also rail connection along the foreshore between the new wharf and the Sule Pagoda wharves.

Improvement at the Port of Rangoon—continued

Yard Buildings, etc.

Buildings in the yard area include a single-storied office to accommodate the Traffic Staff; an open shed for the storage of cargo; and four steel-frame Godowns.

Gate offices and shelters have been erected at the three gateways. Of these, the main entrance to the wharf is at the west



View of Fenders.

end, at the foot of Sparks Street. Exit gates for cargo only are provided on the north, leading to Brooking Street, and at the east end of the yard leading to Judah Ezekiel Street.

Approximately 118,000 sq. ft. of new metalled roads have been constructed and tarred, providing ample space for vehicular traffic in the wharf area; and surface and underground drains have been provided to meet the worst conditions during the monsoon.

General

The wharf was formally opened by the Governor of Burmah on March 31st, 1939, in the presence of a gathering representative of all communities in Rangoon. The s.s. "Talamba," which berthed at No. 2 berth on April 10th, was the first vessel to discharge cargo at the new wharf.

The estimated cost of the whole scheme was Rs. 52,00,000; it is anticipated, however, that the final cost will show a substantial saving. The result has fully justified the Commissioners' decision to undertake the construction of the wharf departmentally.

With the exception of the screw cylinder foundations which support the wharfhead, the whole work of construction has been carried out by the Commissioners' own Engineering Staff, under the direction of the Chief Engineer, Mr. W. D. Beatty, B.A., B.A.I., M. Inst. C.E., who was primarily responsible for the design and execution of the scheme. Mr. F. S. Maconachie, M. Inst. C.E., was the Resident Engineer in direct charge of the work.

With the completion of the two berths at Brooking Street, the port will possess three berths designed and built on the most modern lines, and furnished with up-to-date equipment. This undertaking, together with the further programme of wharf construction in view, justifies the claim that the Commissioners are keeping abreast of the times and providing those modern facilities which are essential to the sea-borne trade of the country, and in keeping with the position of Rangoon as the major Port of Burma.

Sule Pagoda Wharves

Upon the completion of the Brooking Street Wharf, the Harbour Commissioners have decided to enter upon the third stage of the harbour reconstruction scheme, which entails the demolition and rebuilding of the Sule Pagoda Wharves. These wharves were formerly known as the Latter Street Wharves, and are berths Nos. 1, 2, 3 and 4, upstream from Strand Market Wharf. The new wharves will have a total frontage of 1,380-ft., with three transit sheds, each measuring 50-ft. in width, and having lengths of 360-ft., 370-ft. and 380-ft., respectively.

The method of reconstruction will be similar to that adopted at Brooking Street, and the cross-section of the wharves are the same excepting that in the case of the Sule Pagoda Wharves the plans have been modified to allow for an existing retaining wall, which was built at the time of the construction of the original wharves.

The wharves will also be equipped with the necessary cranage, eleven cranes of 2 and 3-ton capacity being provided for the three berths, as well as loading decks, railway sidings and other facilities for the rapid and efficient handling of cargoes.

Three test cylinders have already been sunk to determine the suitability for the substrata.

These tests have shown satisfactory results with the cylinders loaded to 230 tons.

In the case for the reinforced concrete work, it has been decided to use rapid-hardening cement made in Burma.

Further Undertakings

The following are particulars of other new works of a minor character which are still in progress, or have been completed within the last few months.

Lanmadaw Foreshore Development and Improvement.—Work on the reconstruction on the Fish depôt, and the erection of four additional godowns in Block C, was completed last year. A reinforced concrete sampan landing stage was constructed at Phongyi Street, and work is proceeding on the reconstruction of Phongyi Street lower pontoon jetty.

Coal Jetty at Kings Bank.—A new timber coal jetty was constructed at Kings Bank during 1938, to replace the coal landing dolphin rendered ineffective by silting.

New Passenger Jetty.—The New Passenger Jetty at Lewis Street, which cost a total of Rs. 1,44,288 (approximately £10,000), was completed and brought into use in May, 1938.

Extension of Godowns.—Recent extensions to godowns A and B at the Mandalay depôt, Botataung, provide an additional floor area of 10,000 sq. ft.

Import Salt Depot.—A new screw pile cargo boat jetty, 138-ft. long, has been constructed at the Import Salt Depot, Pagundaung. It was opened to traffic on 1st March, 1939.

s.s. "Talamba," the first vessel to berth at the new Brooking Street Wharf.

Trade of the Port

Burma was formally separated from India on 1st April, 1937, and since that date the Burmese Government, by concentrating upon improving the facilities for land and sea transport, has fostered and considerably increased both the internal and external trade of the country. Also, there is no doubt that the military operations of the Japanese in China have caused large quantities of war material and other supplies to be diverted from China's seaboard to other avenues of communication, which have been hastily constructed and have their outlets in Burma or Russia.

The country exports a considerable quantity of rice and teak, which comes from the extensive forests of Burma and the Shan States and overland from Siam. In addition, Burma possesses considerable quantities of petroleum, rubies and jadestone. The

Improvements at the Port of Rangoon—continued

imports consist chiefly of cotton piece-goods and yarn, coal, hardware and metals.

The most recent Annual Report of the Commissioners of the Port shows that the imports and exports for the 12 months ending 31st March, 1939, amounted to 1,741,136 tons, an increase of 87,077 tons over the previous year.

The total sea-borne trade of Rangoon for the past five years, and the proportion handled over the Commissioners' premises, are given in the following table:—

Description of Trade	1934-35	1935-36	1936-37	1937-38	1938-39
(a) Sea-borne Trade—	Tons.	Tons.	Tons.	Tons.	Tons.
Imports ...	1,267,685	1,325,546	1,318,869	1,429,175	1,365,873
Exports ...	4,298,672	3,891,056	3,940,173	3,954,231	3,919,662
Transhipment	21,782	23,898	29,900	32,606	45,314
Total	5,588,139	5,240,500	5,288,142	5,416,012	5,330,849
(b) Proportion handled over Commissioners' Premises—					
Imports ...	641,898 (50.6%)	670,469 (50.6%)	687,014 (52.1%)	697,399 (48.8%)	646,030 (47.3%)
Exports ...	1,142,352 (26.6%)	1,072,000 (27.5%)	1,026,633 (26.1%)	951,131 (24.1%)	1,088,620 (27.8%)
Transhipment	2,603 (12.0%)	3,036 (12.7%)	4,679 (16.1%)	5,529 (17.0%)	6,486 (14.3%)
Total	1,786,852	1,745,505	1,718,326	1,654,059	1,741,136

During the year, 193,259 passengers by sea landed at, and 249,334 embarked from, the Commissioners' wharves and jetties, as compared with 220,230 and 221,302, respectively in the previous year.

The total net tonnage of shipping entering the port was 4,311,002 tons, an increase of 200,531 tons over the previous year. Of the 1,584 sea-going vessels that entered, 955 came alongside the Commissioners' wharves and jetties for the purpose of disembarking passengers and discharging cargo, as compared with 963 vessels in 1937-38.

Accounts.—The working for the financial year resulted in an excess of income over expenditure, amounting to Rs. 1,48,033, as against an estimated figure of Rs. 86,690. Compared with the previous year, income shows a decrease of Rs. 1,20,781, and expenditure a decrease of Rs. 1,79,257.

The total income and expenditure during the last five years is shown in the following table:—

	1934-35	1935-36	1936-37	1937-38	1938-39
	Rs.	Rs.	Rs.	Rs.	Rs.
Income	75,34,972	72,05,954	72,28,187	70,96,781	69,76,000
Expenditure	67,33,811	69,51,709	69,75,689	68,57,224	68,27,967

The Ministry of Transport and War-time Operation of Ports and Canals

At the Annual General Meeting of the Institute of Transport on December 11th, Captain Euan Wallace, the Minister of Transport, spoke on the working under war-time organisation of the country's transport system by the Control Centre at the Ministry of Transport and described some of its administrative problems.

In connection with port operation, he stated that for obvious reasons, he could not say much about this, bearing directly as it did on the measures which were taken to protect shipping from enemy action. It would, however, be obvious that some diversion of ships from their normal ports of call had been and might continue to be necessary, and that rapid clearance of goods through the ports was of the highest importance. In each of the principal commercial ports a Port Emergency Committee had been appointed with wide powers to see that ports were used to their fullest capacity and goods passed through as quickly as possible. Those committees consisted of representatives of the port authority, shipowners, traders, road, rail and canal transport and labour; each committee acted collectively as the Minister's agent.

Importance of Canals

The headquarters organisation of the Ministry was in constant touch with the Port Emergency Committees in order that full regard might be had to port conditions in dealing with the diversion of shipping. Canals and the carriers who operated on them carried in normal times a substantial part of the traffic in the areas which they served, and in war time might be called upon to make an even greater contribution to the national transport requirements. With a view to making the best use of that form of transport he had appointed a Canal (Defence) Advisory Committee composed of representatives of canal owners and canal carriers and of Government Departments directly interested in canal transport.

The Waste of the Canals

(FROM A CORRESPONDENT)

For many months past, this Journal has been waging a lone crusade to impress on the authorities the need for preparation, so that the inland waterways might play their part in an emergency. The emergency so long foreseen has arrived, and in the number for October, attention was again invited to this subject and reference made to articles which have been appearing at intervals for the last two years.

We are now living in the fog of war. The ordinary citizen does not know what is going on in the transport world. Even those engaged in transport, except those on the very top who will not tell, can have little idea of what is happening outside of their own little sphere of work.

But some illumination is by stress of circumstances gradually coming out of the fog. Some reports and letters, which have escaped the censor, have appeared in both the lay and technical press which indicate grounds for some anxiety that in this department, at any rate, the powers that be have failed to profit from the lessons of the past war. "The Times," in a long article, recounts the good work the railways have done, and the whole country will join in the tribute they so well deserve. But the writer also showed that they were working to capacity, and that it was a matter of urgency to find some means of easing their load. Economy in petrol had thrown on the railways a heavy tonnage of goods formerly carried on the roads, and this brought the inevitable difficulties of truck supply. There have been appeals to traders to hasten the release of trucks and to club their consignments so as to get better loading and better duty from the stock available. Reports of coalpit stoppages from shortage of trucks have also been appearing.

And yet, at this time, when the railways have as much as they can manage and every remaining lorry on the road is consuming petrol which should be conserved for war purposes, it is now made public that the traffic on the canals is actually below its peace time volume, and what remains is being steadily lost. "Modern Transport" has now taken up the question and its issue of the 2nd December contains a leading article based on a letter which appears in the same number from the Canal Joint Committee. But all the facts they now adduce might have been taken from the articles which have been appearing in this journal. It may be worth while to briefly recapitulate some of these.

As long ago as January 1938, in an article devoted to another subject, viz. Wartime Port Operation, it was pointed out, incidentally, that the full advantage of port facilities depended on the rapid movement of cargoes in and out of the port, and what a valuable auxiliary to the railways and roads was to be found in the navigable rivers and canals, and a brief reference to the need for the "rationalisation" of the waterways.

Correspondence in the December 1938 number developed this point and pointed out how very useful service could be obtained from the canals if a limited amount of money could be spent on them.

In the issue of October last, the first after the outbreak of war, attention was again invited to this subject but it seems to have fallen on deaf ears.

The letter from the Canal Joint Committee above referred to is a very pertinent commentary on the preceding paragraphs. In the first place the diversion of shipping has brought about many complications and difficulties. This inevitably involves dislocation and congestion on the railways owing to the unequal spreading of the load. If some of this traffic had been put on the canals it would have merely occupied some of the idle water.

But the most serious point in the letter is that which refers to rates and charges. Here it is obvious that the Government has failed to recall one of the many mistakes made in the last war. Then, as now, the railways were taken into "control" on the outbreak. And with the railways were taken the railway ports and the railway owned sections of the canals. And for the greater part of the war the rates and fares in force were retained unaltered irrespective of the continual increase of working expenses.

But, intermixed were the independent ports and canal systems which had to be self supporting and were obliged therefore to increase their charges. As so many of these were in direct competition with the railway undertakings it was the inevitable consequence that the traders transferred their traffic to the ports and to the railways which gave them the lower charges. And the same cause affected the coastwise shipping traffic. This result became so serious that, in the later years, the State had actually to subsidise traders by paying the difference in charges to put their business back to the other means of transport.

Before this happened, as the independent undertakings were being denuded of their traffic, some were brought to the verge

of bankruptcy. One large port at least went into a receivership and others were near it. The Railway Executive Committee itself had to point out that they were increasing instead of reducing the burden on the railways. As a result the Government, in the middle of the war when most of the mischief had been done, established for the waterways "control" similar to that which had been done for the railways in order to equalise the charges. One would have thought that with this object lesson the waterways would now have been taken in hand simultaneously with the railways, but, as the Canal Joint Committee point out, this has not been done, and the waterways are rapidly drifting into the position from which it cost so much to extricate them in the last war and the country is steadily losing their contribution to the winning of the present war.

A morning paper recently reproduced a report, written 150 years ago, on the opening of the Stroud and Lechlade Canal joining the Thames and the Severn, which it described as "the greatest object of internal navigation in the kingdom." And it said "With respect to the internal commerce of the kingdom **and the security of communications in time of war,** this junction of the Thames and the Severn must be attended with the most beneficial consequences." So does history repeat itself. The Lechlade canal has gone, but the Kennet and Avon is still in existence and is capable of restoration.

But, of course, the most important service is to be obtained from the systems constituting the "Cross" to serve two-thirds of England, the details of which are contained in the columns of this journal.

The proper use of the waterways would not only relieve the railways of the burden of the excessive tonnage thrown on them; it would have other incidental benefits. It would reduce the demand for physically fit labour and save from unemployment much labour which, though not fit for either army, railway or lorry service, is quite suited for and accustomed to navigation on the canals and the repairing and construction of the craft. The craft, too, are cheaper and quicker to build than railway rolling stock, and can be handled in the canal yards, so saving some pressure on the railway shops.

We are continuously being told that in three months we have attained a stage of progress that it took us two or three years to reach in the last war. That certainly cannot be said of the subject under discussion, but it still may be not too late to correct the position.

Correspondence

To the Editor of "The Dock and Harbour Authority"

The Use of the Canals

Sir,—The Canal Joint Committee which is widely representative of the proprietors of the principal inland waterways in this country, and of the companies and firms engaged in carrying goods and merchandise on these waterways, have perused with much interest the Editorial comment headed "Port Emergency Committees" which appeared in your October issue and desire to submit the following observations:—

The Port and Transit Advisory Committee appointed local Port Committees to deal amongst other matters with the forwarding of traffic from the ports to inland destinations.

There are also in some ports other local committees appointed by the local port committee to deal in more detail with the question of forwarding.

It cannot be said that the results, taking the country all over, have been very satisfactory. In some cases there has been grave congestion owing to the diversion of shipping and in other cases a shortage of traffic to keep the port fully employed.

This, no doubt, has been unavoidable under the existing war conditions and has to be accepted as such.

The question that arises, however, is whether the best use is being made nationally of the various forms of transport. In this is included rail, inland waterway, road and to some extent coastwise shipping, though we refer more to those means of transport which are mainly engaged normally in conveying merchandise between the ports and inland centres.

The railways are at present congested with traffic. The congestion arises largely through the extensive movement of troops and military stores and equipment and has been increased in some parts of the country by diversion of shipping from one port to another port and interference with coastwise traffic.

On the other hand, traffic on inland waterways has in many cases been reduced by diversion of shipping and, on some of the principal inland waterways. boats have had to be tied up and crews dispersed owing to lack of employment. This can be regarded only as a real calamity.

It is submitted that where shipping is diverted from one port to another port full use of inlaid water facilities should, wherever possible, be made for forwarding traffic from the port to which the shipping has been diverted, so that a greater proportion of the rolling stock of the railways will be made available at places where traffic can only be carried by rail.

It seems that insufficient steps are being taken to secure full co-ordination of the various forms of transport.

Should there be enemy air raids over the country, with probable damage to the railway system, any delay in making the fullest use of the inland waterways would be disastrous.

Furthermore, road transport is experiencing considerable difficulty owing to fuel shortage. This difficulty has not occurred on the inland waterways, largely because their fuel requirements in proportion to the tonnage carried are far smaller.

The inland waterways, and to some extent also the roads, are suffering from another very serious disability. The railways, being under the control of the Government, though the terms are not yet known, will no doubt be protected against losses. The wages costs and also the cost of fuel, stores, maintenance, etc., have been very considerably increased and as it appears to be the policy of the railway companies, presumably by their agreement with the Government, not to put up rail rates, it is becoming increasingly difficult for other forms of transport to carry their traffic on competitive terms with the railway companies.

Prior to the war, the relative rates had been settled to a considerable extent by conferences, but these are now in abeyance and as the public refuses to pay any higher rate than that by rail, the inland waterways in many cases are prevented from increasing their rates to an economic basis.

The difficulty was met during the last war by controlling the main waterways, so as to protect them against having to carry traffic at a loss, but so far this has not been done during the present war and, as a consequence, the financial position of some of the principal waterways is becoming very difficult.

A further point is that, wherever practicable, the transfer of cargo from sea-going ships to inland waterway craft is beneficial to the Port and Harbour Authorities and to the Shipping Companies, as it greatly facilitates the discharge of the cargo by enabling the ship to be worked on both sides at the same time.

In conclusion, we urge strongly that the waterways should be enabled to take their full part in the national transportation service of the country while war conditions prevail.

Yours faithfully,

THE CANAL JOINT COMMITTEE.

9 Victoria Street, S.W.1.

15th December, 1939.

A New Trailing Suction Dredger

Some particulars are given in contemporary technical literature of a new dredger called the "Chester Harding," which has been constructed for the U.S. Corps of Engineers. She is rather unusual in arrangement, having the engine room in the centre of the ship, with hoppers both fore and aft. Her dimensions (300-ft. between perpendiculars, 56-ft. moulded beam and 20-ft. loaded draught) bring her towards the group of large sea-going dredgers which have been built in the last few years. The total horse-power on the main engines is 3,300, to which must be added 600 for auxiliaries, 125 for standby services and 33 for emergency. All the prime movers are diesel-driven. The pumping plant consists of two 4-cycle, single-acting, airless injection trunk Cooper-Bessemer engines, directly coupled to two 22-in. centrifugals. The propelling plant consists of two 1,000 h.p. 2-cycle airless injection Busch-Sulzer engines direct coupled to the propeller shafts. The auxiliaries are served by a 600 h.p. diesel driving a 400 kw. generator, and the two smaller plants are similarly diesel electric.

Doubtless influenced by the success of the "Pierre Lefort," the suction arrangement consists of two overside pipes with trailing arms on either side of the vessel. These pipes pass through the hull above the waterline to protected elbows. The discharges from the pump lead to the hoppers with the appropriate controls for distribution. Quarters are fore and aft, messing in the middle deckhouse and the bridge forward of the front hopper.

It will be interesting to learn how well this dredger satisfies the projected requirements. In the U.S. Corps of Engineers the "Ambrose Channel" type of drag head, consisting of a shoe-shaped receiver resting on a grid which scrapes the sea bed has long been favoured and if this type is being used, it will doubtless operate fairly satisfactorily on a flexible pipe. Whether it is preferable to the definitely ploughing type of head, as used on the Fruehling dredger, is still a matter of doubt, since the latter has never been really well designed for sand dredging.

The trailing pipes will disturb the steering in cross-currents unless they touch the sea bed near the centre of the ship, but their flexibility may allow for this.

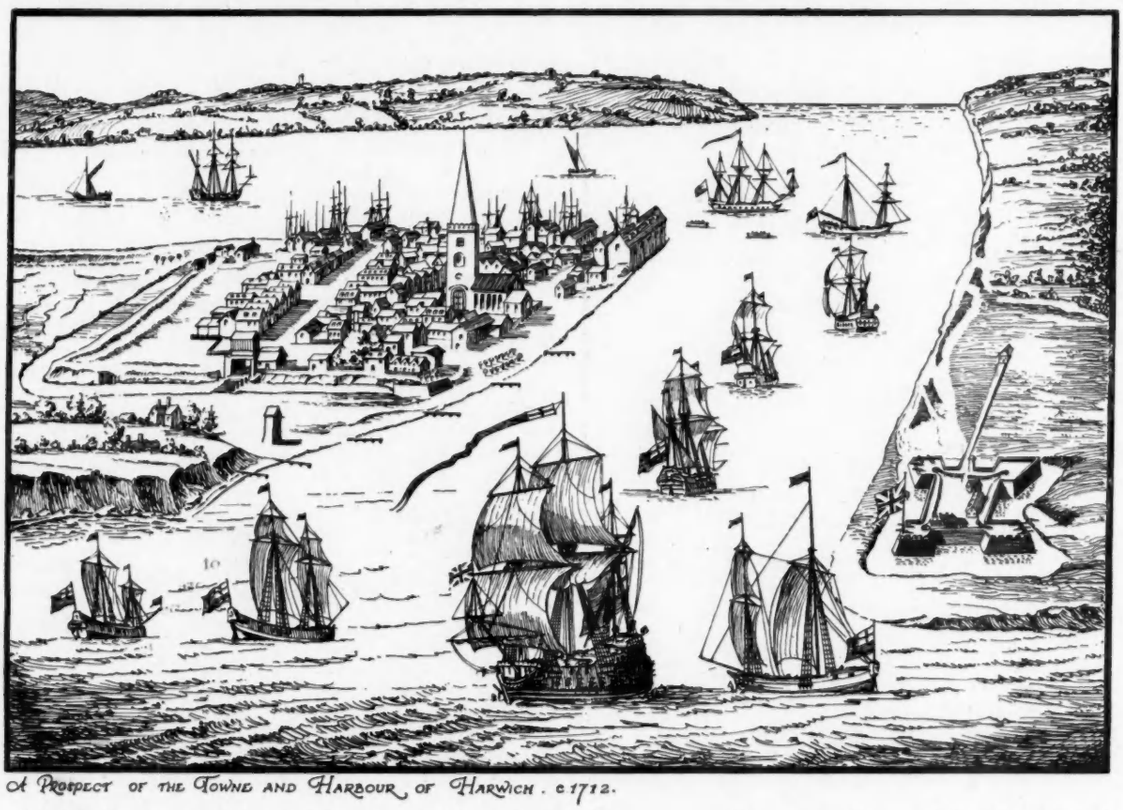
The reversion to the use of diesel drive is interesting, the last precedent being probably the dredger built for the Argentine Republic by J. and K. Smit. One has the impression that diesels are not so satisfactory for the fluctuating processes of dredging as the more elastic steam engines, but it would seem as if this difficulty had been overcome.

Harwich Harbour

Review Notice

The History of Harwich Harbour; particularly the work of the Harwich Harbour Conservancy Board, 1863-1939. By B. Carlyon Hughes. Pp. 197. With 12 plates, including maps and charts. Price £1 1s. 0d. (1939: Harwich Harbour Conservancy Board).

The inception of this interesting and valuable record is due to the initiative of the Authority which administers the port and Harbour of Harwich, and the Conservators are to be complimented alike on their public-spirited enterprise and on their choice of a chronicler. In a foreword to the book, Alderman Johnson Cann affirms the confidence inspired by Major Carlyon Hughes, "whose research and writings on local muniments and records have already won just merit."



A Prospect of the Towne and Harbour of Harwich. c1712.

[Block by Courtesy of the Standard Printing & Publishing Co., Harwich]. [From "The History of Harwich Harbour."

A perusal of the volume fully justifies the assignment of the task to Major Hughes. He has produced a work which will not only be of service to present and future members of the Board, in providing them with essential information, but will interest a wider circle of readers who are in any way concerned with the administration of harbour affairs.

Commencing with a eulogistic extract from Drayton's Polyolbion on the merits of the harbour, written in 1613, the author proceeds to a detailed historical account of the development of the maritime potentialities of the sheltered area formed by the junction of the Rivers Orwell and Stour at their mouths. The known history of the harbour extends over a thousand years, the earliest quoted reference to it being a brief note in the Anglo-Saxon Chronicle for the year 885, where it is called Stourmouth. But early references, though illuminating, are merely fragmentary and it is not until the nineteenth century that records begin to take consecutive and regular form.

On the whole, the harbour maintained its original conformation for a long period, though "evidence goes to show that throughout the centuries the entrance gradually shifted to the South West."

Under the influence of natural causes, the change was slow, but, in 1812, artificial agencies, introduced for the obtainment of thousands of tons of cement stone, or septaria, from Cobbold's Point, Felixstowe, and from Beacon Hill, Harwich, hastened matters very considerably. The dredging of rock at the former site resulted in the removal of a natural breakwater and groyne, which was followed by the loss of much land to the West of it and the extension of the shingle at Landguard Point by about 500 yards. The removal of rock from Beacon Hill caused the erosion of the cliff to such an extent as to widen the estuary considerably, so that the scouring effect of the tides was weakened and the accumulating shingle at Landguard Point was no longer swept away.

It should be explained that the cement stone, or septaria, which are nodules of chalky material, found also in the Estuary of the Medway and elsewhere, were used in the manufacture of Roman cement, which, at the time, had considerable vogue as a building material, but has since been superseded very largely by Portland Cement. The stones were broken to fragments, burnt in a kiln and finally ground into powder. The traffic, which commenced in 1812, proved very lucrative and Captain John Washington, R.N., afterwards Rear-Admiral and Hydrographer to the Navy, who presented, in January, 1843, a report on the deterioration of the harbour entrance, stated that he was credibly informed that at that date upwards of a million tons of stone had been removed from the Harwich shores.

The shoaling of the river mouths became so accentuated that some action was inevitable, and ultimately, in 1846, the Admiralty ordered the building of a stone groyne for a distance of 800 yards from Beacon Cliff and the dredging of an East Channel near the Suffolk side of the harbour to a depth of 18-ft. below low water, and the dredging to 15-ft. below low water of an area to the West of this Channel.

About this time, or a little later, the question of the utility of Harwich, as a National Harbour of Refuge came under consideration and, in 1862, a select committee of the House of Commons was appointed to enquire into the best means of preserving the harbour as a harbour of refuge. The report of this Committe led to the passing of the Harwich Harbour Act, 1863, which authorised the appointment of nine conservators and gave them various powers.

The Conservancy Board so formed has functioned down to the present time, and from 1868 onwards, the book contains a brief review of the chief points of interest during each year. An item in the year 1875 is the unusual application to the Board by Mr. Earthy, of Mistley, who asked to be allowed to melt fat in a boat on the Stour for the purpose of making candles.

In 1884 it is recorded that the Clerk's salary was raised to £90 and, in 1901, the Engineer's salary to £100 per annum.

In 1889, a long report was received from the Board's Engineer recommending an extensive scheme of harbour improvement estimated to cost £12,000, which was referred by the Conservators to Sir John Coode and Captain Tizard, R.N. The conclusion that the referees arrived at was, that there was no immediate necessity for further expenditure than might be required to protect, by means of an apron of concrete blocks, the foot of the existing jetty along part of its South-Western side.

From 1903 onwards, dredging operations were in progress and were completed in 1910. A minimum depth of 19-ft. at L.W.O.S.T. was obtained in the channel. The process of dredging was not altogether easy on account of the rock encountered. In a report by the engineer in charge, it is stated

Harwich Harbour—continued

that two grab dredgers were employed throughout, being laid up in the inner harbour during the winter months. The rock was blasted without serious difficulty. Some of the pieces weighed over 4 tons. Other material raised was sand, mud, clay and gravel.

On November 20th, 1918, at the conclusion of the war, the surrender took place, in the harbour, of 150 German submarines, which were moored in the Stour above Parkeston.

The foregoing are merely a very few of the items of interesting information tabulated in the pages of the book, which towards the end incorporates a chapter on the Trade of the Port, including an account of the fishing industry; this, regrettably, has declined, despite the fact that the harbour is so near the London market. For the financial year ended 31st March, 1939, the income of the Board of Conservators was £6,993 and the expenditure £4,972. The author concludes with the opinion that "to-day the much-improved harbour is not being used to its fullest capacity and if, and when, additional docks and wharves are built, the trade of the port is likely to increase still further. Should the need arise, the harbour is now even better equipped to become the base of a North Sea Fleet, as it has been so often before."

There are four appendices, with statistical and statutory information, and a pocket in the cover for a modern chart of the harbour, which "will be sent when available," i.e., presumably at the conclusion of the present state of war. The book is excellently produced, but, unfortunately, lacks an index.

Trade and Traffic at Southampton Docks

A Review for the Year 1939

By R. P. BIDDLE, M.Inst.T., Docks and Marine Manager, Southern Railway.

The interruption of normal commercial activities by the outbreak of hostilities in September last naturally affected to an appreciable extent the trade returns of Southampton Docks. In view of the complete change in conditions which obtained following the commencement of the war this annual survey of trade has been limited to the period preceding the war, i.e., January to August, 1939.

The opening months of the year gave promise of a steady improvement being registered in all branches of shipping traffic compared with 1938. Throughout the first half of the year a series of increases was recorded in the monthly returns of cargo imported and exported and in the number of passengers embarking and disembarking. In the case of freight traffic the improvement persisted up to the outbreak of war but passenger movements, notably pleasure cruising, soon revealed a decline which reversed the earlier trend of traffic.

A comparative statement of activities at the docks for the periods January-August, 1939, and the corresponding eight months of 1938, shows that whereas a small reduction of 431,505 gross tons or 3% was noted in the quantity of shipping tonnage entering—12,349,098 gross tons against 12,780,603 gross tons in 1938—there was an increase of nearly 10% in the amount of cargo imported and exported. As stated above, passenger traffic did not fulfil early expectations and the aggregate number of 397,688 dealt with represented a falling off of 4% both inward and outward figures being lower than in 1938.

Although new trade was brought to the docks by the decision of the United States Lines to use Southampton as an eastbound calling port for their "President" class liners on the New York express service, and there were augmented sailings by the Cunard White Star and Holland America Lines' vessels engaged in the North Atlantic trade, the additional tonnage so acquired was largely offset by reductions in the schedules of the German shipping companies, the Norddeutscher Lloyd and Hamburg-American Line, operating on the New York route. A marked reduction in the number of passengers travelling by German ships in 1939 undoubtedly influenced the curtailment of the last-mentioned services. Other services maintained on a reduced schedule during the year were the German East Africa and Woermann Lines' connections with South, East and West Africa. Nearly all the companies engaged in pleasure cruising activities carried out smaller programmes than in the preceding year and this constituted a major factor contributing to the lower shipping tonnage returns for 1939.

The fleets of several companies regularly using the docks were strengthened by the addition of new tonnage and among the notable liners making their initial appearance at Southampton during this period were the Cunard White Star "Mauretania," 35,739 gross tons, which was placed in commission on the New York service, and the Shaw, Savill and Albion motor vessel "Dominion Monarch," 27,000 gross tons, which commenced her maiden voyage to the Antipodes in February. A considerable amount of tonnage was added to the various South African services of the Union-Castle Mail Steamship Company, Southampton, in the first seven months of 1939, receiving the new intermediate liners "Durban Castle," and "Pretoria Castle," each of 17,000 gross tons, and the latest refrigerated cargo motor ships "Rowallan Castle" and "Richmond Castle," of 7,800 gross tons each. The Holland Africa liner "Klipfontein," of 10,544 gross tons also joined the African trade with her departure from the docks on the 19th August.

The higher level of imports in 1939 was principally due to general improvement in the South African trade and to the receipt of heavier grain and timber shipments. Larger quantities of wool, grain, meat and hides came from the Union but, on the other hand, the important deciduous fruit traffic did not reach the dimensions attained in 1938. In the last-mentioned period 4,046,000 packages of such fruits were dealt with at the docks, but exports from the Union to the United Kingdom fell to 3,767,000 packages in 1939, Southampton handling 3,633,000 packages, or practically 100% of this total. Citrus fruits from the same source maintained the preceding year's standard and approximated to 2,000,000 packages.

New cargo refrigerated motor ships commissioned by the Union-Castle Mail S.S. Company on the South African route made possible almost a weekly homeward service to Southampton—in addition to the mail liner service—during the months of June and July when huge consignments of oranges and other citrus fruits were in transit to home markets. Some idea of the proportions of this traffic when at its seasonal "peak," is afforded by the fact that during one week in August five vessels brought more than 300,000 packages to the docks. —

Discharge of a record shipment of 60,000 cases of Australian apples and pears ex the Aberdeen and Commonwealth liner "Largs Bay" in April last, provided the most interesting feature of the port's steadily increasing import trade from the Antipodes during 1939.

A less satisfactory phase of the import trade was a decline in South American cargoes, this being chiefly caused by a reduction in meat supplies from the Argentine.

The position with regard to the export traffic was encouraging, the volume of freights shipped to most parts of the world being greater than in 1938. This improvement was especially marked in the North Atlantic trades to the United States and Canada while cargoes to South Africa, the Far East and to coastwise destinations also revealed increases upon 1938 tonnages. On the whole the amount of freight exported during the first eight months of the year represented an advance of more than 12% over the corresponding period of the previous year.

Chief among the factors which exerted a favourable influence upon North Atlantic passenger traffic during the first half of 1939 were the Royal Visit of Their Majesties the King and Queen to Canada and the United States, and the New York World's Fair. A gracious compliment was paid to Southampton—Britain's premier passenger port—on the 22nd June when the King and Queen disembarked at the docks upon the conclusion of their American tour.

Apart from the decrease in cruise travel no outstanding change in the total movements of either ocean or cross-Channel passengers was recorded. On the North Atlantic route, however, a considerable turnover of traffic from the German companies to British and United States shipping lines was observed.

On the cross-Channel routes operated by Southern Railway steamers a small increase of 2% was registered in the numbers of passengers conveyed up to the end of August, 1939, as compared with the similar period of 1938. Interruption of the holiday season by the commencement of hostilities reacted adversely on what promised to be a particularly successful season for this important traffic. Facilitated this year by the introduction of a daylight service to St. Malo in July the exodus of holiday-makers to this part of France was even more satisfactory than in the preceding year when record figures were set up.

One of the principal items of interest with regard to activities at Britain's Marine Air Base was the commencement of regular transatlantic air mail and passenger services between Southampton and New York. Pan American Airways inaugurated a passenger service in June, 1939, while on the 5th August Imperial Airways liner "Caribou" initiated the first British regular mail connection on the same route. Continued expansion of traffic by the various Empire flying-boat services maintained from Southampton was also recorded during the period under review.

Obituary.

The death has occurred of Mr. W. A. Evans, an official of the Port of Bristol Authority, with whom he served as assistant in the Haven Masters Department, in connection with hydrographic surveying, lighthouses and signal stations. He had previously been in the service of the Mersey Docks Board and the Humber Conservancy.

Dock Gates*

By F. M. EASTON, A.M.Inst.N.A., A.M.I.Struct.E.

(Concluded from page 46)

Top Gudgeons and Anchorages

The top deck of the gate carries a forged steel gudgeon (Fig. 6, p. 42, Dec. issue) which rotates in a collar or strap attached to the top anchorage. Fig. 9 (p. 45, Dec. issue) shows the type of anchorage commonly used for gates fitted with rollers. It can be applied to rollerless gates, but the type shown in Figure 10 is simpler and is generally adopted for the purpose.

Anchorages of the type shown in Figure 9 differ considerably in detail, but generally the anchorage consists of a forged steel hairpin strap with screwed ends, carried in a cast-iron or cast-steel block bedded to the granite quoin stone and secured by rag bolts. The block is tied back into the lock wall by two (sometimes three) forged steel or rolled steel anchor bolts, each secured to the anchor block by gibs and cotters and fitted with a cast-iron washer plate and thrust plate. The thrust plate is sometimes omitted.

Occasionally the anchor bolts are led through steel sheathing pipes (filled with bituminous mastic) and the washer plates screwed up after the bolts have been given an initial tension greater than the maximum load they will bear in service, in order that their elastic stretch under the working load shall not affect the adjustment of the heel post in the hollow quoin, or tend to loosening of the anchor block from its seating. The amount of stretch ($\frac{1}{16}$-in. at most) is small in comparison with the heel post clearance that must be allowed in practice with roller gates; initial tension of the anchor bolts is therefore unnecessary so far as adjustment of the heel posts is concerned. With regard to the security of the anchor block, the alternative to initial tension in the anchor bolts is to embed them and their washer plates and thrust-plates solidly in concrete and to rely upon adhesion between the concrete and steel to restrain the bolts from stretching to an extent sufficient to affect the anchor block. So far as the author is aware, no ill effects have resulted from following the latter practice.

In the type of anchorage shown in Figure 9 the heel pin of the crocodile—if a crocodile is fitted—is usually anchored by a steel plate recessed into the main anchor block and bolted to it. Sometimes, with direct-acting hydraulic gate machines of great power, the arrangement has proved too weak and it has been found necessary to provide an independent anchorage for the crocodile heel pin, consisting, in principle, of an eyeplate firmly secured to tie rods arranged to take both pull and thrust. A similar independent anchorage would be advisable for a crocodile employed in conjunction with a gate anchorage of the type shown in Figure 10.

The anchorage shown in Figure 10 is particularly suitable for rollerless gates as it enables the heel post to be pulled well into the hollow quoin and maintained in that position, adjustment to take up wear being easily effected. It is essential, with these gates, that the heel post should be kept bearing from top to bottom in the quoin when swinging, otherwise the concentration of pressure at the lower end will lead to rapid wear and heavy leakage of water between the mitre posts.

The anchorage consists of a forged steel eyeplate encircling the top gudgeon and connected with link-plates to a pair of anchor bolts, with adjusting screws and nuts having right and left-handed threads. Elongated holes are provided in the link-plates to prevent the bolts from put into compression; thrust plates are not required. The bolts are about 20-ft. long and may be bent over cast-iron saddle blocks to enable the washer plates to obtain a more effective hold on the masonry of the lock wall, the whole, with the exception of the adjusting nuts, being concreted in.

The angle between the anchor bolts should be at least equal to that through which the gate swings; when the gates are worked by a direct-acting hydraulic machine without the intervention of a crocodile, the anchor bolt nearer the gate recess should be placed at right angles to the coping line in order that it may better be able to take the thrust from the machine. With machines of great power it is better to provide a third anchor bolt extending in a direction approximately parallel to the centre line of the operating cylinder

The anchorage and top gudgeon must be designed to carry the weight of the gate in the dry (no account being taken of support from the roller, if fitted), together with the forces transmitted by the operating machine. The swinging weight of the gate W and the vertical reaction of the pivot constitute a couple

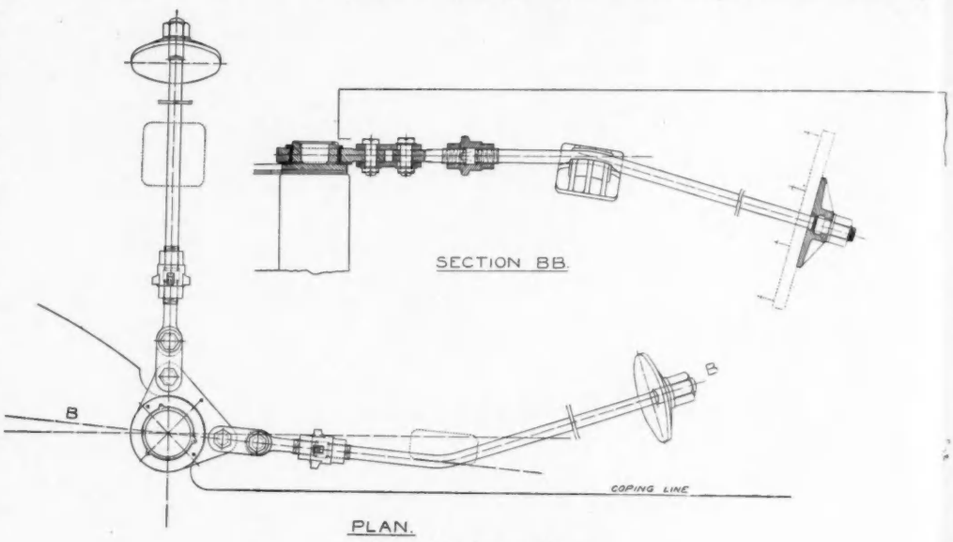


Figure 10 Gate anchorage.

having an arm approximately equal to $\frac{L}{2}$, half the length of the gate. The supporting pull of the anchorage and the resultant horizontal reaction of the hollow quoin form a balancing couple with a lever arm approximately two-thirds of D, the depth of the gate, on the necessary assumption that the anchorage may be pulled up until the top of the heel post is just bearing in the quoin and that the pressure increases uniformly to a maximum at the bottom. Hence the pull on the anchorage due to the weight of the gate is approximately $\frac{3WL}{4D}$. The maximum reaction of each anchor rod to the pull or thrust of the operating machine, with the gate at any part of its travel, may be ascertained by the methods of statics and may be taken approximately as the full thrust, M, of the machine.. The anchorage and top gudgeon should be designed to take a total load of $\frac{3WL}{4D}+M$ with a factor of safety of 3 to $3\frac{1}{2}$ on the ultimate strength. At the same time, under normal working conditions the stress on the screwed parts of the anchor bolts should not exceed $3\frac{1}{4}$ tons per square inch at bottom of thread. Threads should be to British Standard Fine gauge and the plain part of the bolt should be turned to a diameter of about 90% of the diameter over threads.

The top gudgeon and anchor strap or eyeplate are sometimes fitted with a roller bearing but in many cases the working load is such that it is sufficient to bush the anchor strap with hard phosphor bronze.

A holding-down cantilever girder may be bolted to the masonry as a safeguard against accidental lifting of the gate off the pivot, such as might occur through unmitreing the gates with a foot or so of backing. Gates should never be opened before the water levels are equal on both faces.

Fendering

As a protection against damage by shipping, fender timbers of creosoted pitch pine are fitted to the front of the gate, ex-

*Paper read before the Institution of Structural Engineers on 24th November, 1938, and reproduced by kind permission of the Institution.

Dock Gates—continued

tending to the lowest working level of water or a little further down. The fenders may be about 12-in. by 7-in. arranged to bear on the skin plating in way of the decks and diaphragms as shown in Figure 1. the horizontal fenders being fitted between the vertical ones and flush with them. An alternative arrangement is to fit 11-in. by 7-in. vertical support timbers at the diaphragms and intermediately, with 12-in. by 7-in. horizontal fenders connected to the support timbers by coach screws; the horizontal timbers should have spaces 1-ft. wide between them filled with vertical chocks at the support timbers. Fenders or support timbers bearing on skin plating should be well bedded upon thick red lead paint and bolted to angle lugs riveted to the skin.

Vertical fenders are provided on the back of the gate to act as stops when the gate is drawn into its recess. At least two stops should be fitted, one on either side of the attachment of the gate operating machine. Doubling plates should be provided on the skin plating under the stop timbers.

Instead of fitting the stop fenders on the back of the gate they may be atached to the wall of the gate recess. This alternative is likely to lead to more rapid corrosion of the plating; doubling plates should be provided on the skin, as before.

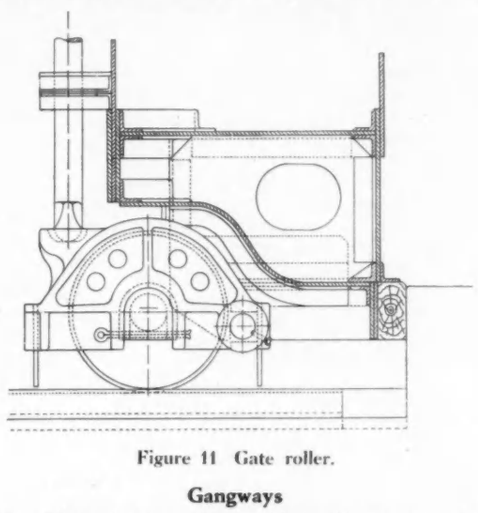


Figure 11 Gate roller.

Gangways

The top of the gate is usually provided with a gangway, decked with greenheart, oak or creosoted pitch pine, 3-in. to 3½-in. thick, arranged transversely. The decking is supported by mild steel boundary angles and vertical brackets bolted to the top deck. Timber fenders should be provided on the face of the gangway and its supporting brackets. The whole of the gangway structure should be strongly designed to resist longitudinal or transverse racking from ships passing through the lock. Stanchions and guard chains are of the falling type. Hatches should be provided in the gangway deck in sufficient number to permit easy access to the top gudgeon, to the top deck and to the air chamber and ballast chamber.

Access, Ventilation and Drainage

A trunk is provided for access to the air chamber, the top being placed above the level of the highest recorded tide. In gates for entrances 100-ft. wide or more, two access trunks should preferably be fitted. The trunk should not be less than 30-in. by 24-in. inside, with a ladded extending to the bottom of the gate. Ladders should also be fitted to facilitate access to any part of the water ballast chamber.

Decks and diaphragms should be well provided with manholes of ample size as shown in Figure 1, not only to render easy access for inspection and maintenance but to assist ventilation and prevent the formation of pockets of foul air. The top deck of the air chamber should have manholes between the diaphragms, with bolted watertight covers. Manholes in decks should be arranged vertically under one another to facilitate construction and subsequent maintenance.

Access manholes with bolted watertight covers should be provided in the flat skin plating near the bottom both of the air chamber and of the water ballast chamber.

Each gate is fitted with an air supply pipe of 3½-in. to 4½-in. bore extending from well above the top deck to the bottom of the air chamber and having a portable cowl at the upper end. An adapter should be provided so that air may be pumped into the gate when maintenance work is being carried out *in situ*. Air is exhausted through the access trunk.

To deal with any accumulation of water leaking into the air chamber a hydraulic ejector is provided, drawing from a sump in the bottom deck.

The arrangement of air and ejector pipes is indicated in Figure 1. All pipes should be of galvanised wrought iron, not less than ¼-in. thick.

Sluices

Modern dock entrances are provided with levelling culverts in the walls of the lock, but in some older entrances the levelling is done through sluices in the gate leaves and similar provision must be made when renewing the gates. Sluices in the leaves are occasionally required, also, for clearing accumulations of silt from the lock invert.

A gate sluice consists of a cast or mild steel frame secured to the back plating of the gate and having a flat face on which the cast iron sluice door works vertically in cast steel guides. The bearing surfaces are faced with phosphor bronze or manganese bronze. The doors are operated by single or double rods of wrought iron, carried up the gate through cast-iron guides bolted to the skin plating. The sluice rods may be worked from the gangway deck by hand gearing but the operation by hand is usually so slow that it is preferable to fit hydraulic double-acting cylinders to the back skin plating at the top of the gate.

The rectangular watertight sluiceways pass through the gates between a pair of decks specially constructed to form the top and bottom of the sluiceways. The mild steel sluiceway plating is particularly liable to corrosion and erosion; on this account an additional thickness of ⅛-in. should be allowed, above the thickness ordinarily necessary for strength.

Gate sluices and their machinery are, from their exposed position, liable to damage. They are often troublesome to maintain in good order because the parts are not easily accessible and in some cases are permanently under water. If possible, their use should be avoided.

Strut Gates

At entrances exposed to the impact of heavy seas, storm strut gates are occasionally provided, in addition to storm wires, to hold the main gates in place when mitred. A strut gate is a steel or timber frame, housed, when not in use, at the back of the gate recess. It is provided with a vertical heel post and supported by a pivot and top anchorage and can be swung out so that the adjustable bearing blocks at the outer ends of the horizontal strut members bear on chocks bolted at two or more points on the back of the main gate.

Strut gates should be made capable of holding up the main gates safely, not only against wave action but also under a reverse head of water, such as may accidentally come upon their faces from a spring tide of exceptional height. The strut gates must therefore be strongly designed and must support the main gates both near the top and well below the centre of the depth. If a light or weak strut gate only is provided to bear on the upper half of the gate, the pressure due to a reverse head may force the lower part of the main gate out of place with disastrous results; such an accident has actually occurred.

Materials and Workmanship

The ferrous materials used in the work should be strictly to the following specifications, a suitable grade being selected where necessary:—

Mild steel plates, rolled sections and rivet bars, B.S.S. 15.

Mild steel forgings, B.S.S. 29.

High carbon steel forgings, B.S.I. Report 24, Specification 8, Class D. The forgings should be oil tempered.

Steel castings, B.S.S. 592.

Iron castings, B.S.S. 321.

Greenheart for the sealing timbers must be of prime quality, specially selected so that the finished sections will be free from all defects.

All workmanship should be of the highest quality, assured by strict and frequent inspection throughout every stage of the manufacture and erection.

The steelwork should be at least equal to the best description of boiler work, all parts being closely fitted to prevent racking in service and to permit watertight work to be caulked metal to metal.

The decks should be constructed to a gauge for dead length and bevel, to ensure that the web plates and boundary angles will bear fully on the heel and mitre plates and corner angles.

Rivet and bolt holes should be drilled through the full thickness of adjoining parts when such parts are fitted and clamped together in place, and the parts should afterwards be taken apart for the removal of drillings and wire edges.

Riveting should be carried out by hydraulic power so far as possible. Service bolts should be inserted in every third or fourth hole to close up the work for riveting. All faying surfaces should be painted with red lead or with bituminous solution before being put together for riveting.

The riveting in the skin plating must be closed up in such sequence as to avoid any distortion in the true shape of the gates; the alignment of the heel and mitre plates must be frequently checked, and corrected if necessary by cutting out rivets and re-riveting.

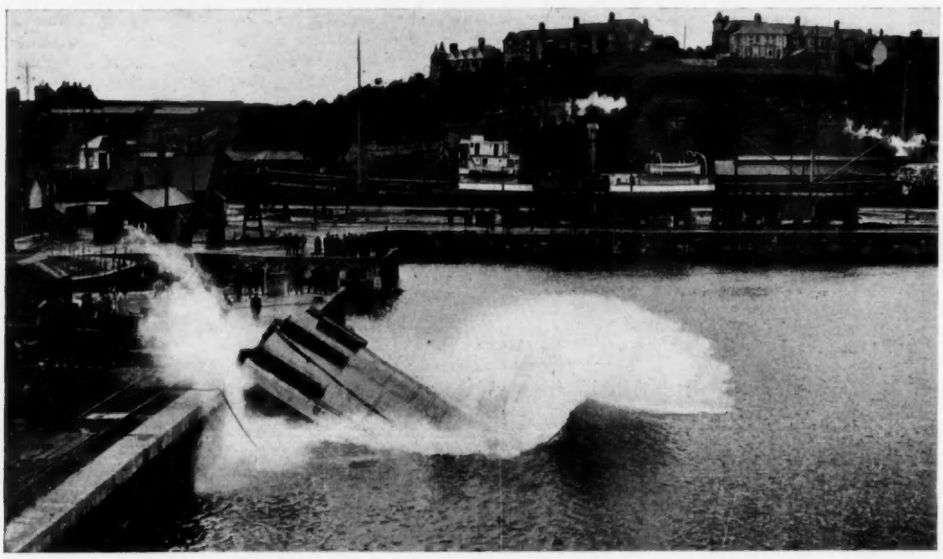
All welding should be done by the electric arc process, using heavily coated electrodes. The preparation of the work and the welding procedure must be such as to produce joints of high efficiency without distortion.

Dock Gates—continued

Erection and Testing

Gates are erected either upright in the lock on the gate platform or, when this is not possible, they are erected on the quay, flat face downwards and are then launched (Figure 12) and stepped in position with the aid of floating cranes or catheads, or by making use of their buoyancy.

The steelwork is tested for watertightness by filling each watertight space separately with water under a pressure equal to the maximum head under working conditions. Leaks are remedied by caulking or re-riveting and the work is re-tested until all is perfectly watertight. The water test should be carried out before any timber is bolted to the gate and before any paint or protective composition is applied.



Photo] Figure 12 Launching a 160-ton gate over the quay wall. [Western Mail & Echo, Ltd.

The greenheart sealing timbers are dressed to templates and measurements taken from the hollow quoins and pointing sills, all the work being carried out with the greatest possible accuracy to secure a perfect watertight fit when the gates are in position and mitred to withstand a head of water.

Painting

Having regard to the inconvenience to shipping traffic which may result from lock gates being taken out of commission for overhaul, and to the expense attendant upon such operations, it is important that the best means obtainable should be used to protect the steelwork from corrosion over as long a period as possible. The investigations of the Corrosion Committees of the Institution of Civil Engineers and of the Iron and Steel Institute have shown that a primary requisite is the complete removal of mill scale; this should be effected by completely immersing all the mild steel plates and rolled sections in dilute hydrochloric acid, afterwards hosing and scrubbing with fresh water. The several months that elapse between the initial pickling and the application of the protective coating—which should be deferred until the erection is completed—afford a period of weathering during which any deleterious effects due to occlusion of hydrogen by the steel will disappear.

From the sea-water corrosion experiments above-mentioned it may be deduced that, for the protective coatings, there is little to choose between (i) three or four coats of tar applied direct to the steelwork and (ii) two or three coats of tar applied over a priming coat or two of red lead paint. In the author's opinion, even more lasting protection can, perhaps, be obtained from bituminous enamel applied hot over a priming coat of bituminous solution. Tar is objectionable inside the air chamber from its tacky nature and in this situation bituminous enamel or multiple coats of red lead paint or white lead paint have all given satisfactory results in certain cases. The question, however, of what is the most satisfactory preservative coating is still a moot-point and must to some extent depend upon the site conditions, the salinity of the water and the nature and extent of any impurities present.

If tar is used, it should be dehydrated coal-gas tar obtained from horizontal retorts; vertical-retort tar does not give such satisfactory results. The tar is applied hot, mixed with about ¼ lb. of slaked lime and ¼ lb. tallow to the gallon.

Before paint or tar is applied, the steelwork must be thoroughly cleaned and wire brushed for the complete removal of rust and dirt. While the work is in progress the steelwork must be kept completely dry; if as a result of atmospheric or other conditions the surface becomes moist or frosty, painting should be stopped. Pigment paints should be well brushed in with stiff brushes. No trouble or precaution can be too great to ensure the full observance of these requirements, for upon them depends the durability of the coating and the life of the structure.

Maintenance and Durability

As mentioned previously, little in the way of repair work, except to rollers, can be carried out without removing the gates; painting *in situ* also is of doubtful value so far as parts exposed to tidal immersion are concerned.

Gate rollers are a source of considerable trouble in maintenance; they must be periodically examined by a diver to ensure that they are working properly and that the spear posts are bearing throughout the travel of the gate; the spear posts and anchorages must be adjusted from time to time with the same object. The anchorages of non-roller gates should be examined and adjusted occasionally to ensure that the heelposts are bearing from top to bottom.

Of the sealing timbers, the heelposts—particularly of gates fitted with rollers—are subject to wear; the clapping sills may suffer wear and damage from causes already mentioned; the mitre posts do not wear to any great extent. Under favourable conditions a clapping sill may be renewed by diver's work but this is seldom attempted.

Mechanical devices, particularly screwed fittings under water are difficult to maintain in good order and should be avoided. Simplicity of design is always preferable for easy maintenance.

Maintenance troubles are largely eliminated by care in working the gates, by avoiding excessively powerful operating machines and by reasonably restricting the speed of operation; attention to these matters as well as to careful design and construction will add considerably to the life of the gates. Factors outside the control of the engineer—such as the degree of exposure to wave action, the range of tide in which the gates must be operated, the greater or less corrosive action of the water and the frequency or otherwise of working—make for considerable variation in the periods within which gates must be taken out for overhaul and in their durability.

Iron gates have had an average life of about forty years. All-steel gates have not yet been in use long enough to afford experience whether they will last as long, but it appears likely that to attain as long a life as iron gates they will need to be taken out periodically for thorough cleaning and re-coating.

The author desires to express his thanks to Mr. R. Carpmael, Chief Engineer of the Great Western Railway Company, for permission to present this paper.

New Pier at Staten Island, New York

The approaching completion is announced at the Staten Island Yard of the Bethlehem Steel Company of a new pier, 705-ft. long by 24-ft. wide, constructed with a reinforced concrete deck supported on timber piles. It is the second of eight piers in the yard to be rebuilt during the year and replaces the old timber structure known as Pier No. 3.

The concrete decking, which is 10-in. thick, rests on creosoted yellow pine piles driven to take a load of 15 tons. The decking slopes slightly to the outer face. There is an overhang at the outer end, 9-ft. long by 57-ft. wide.

The following additional particulars are extracted from the announcement in "World Ports." The rails for the crane runway are laid on H-beams resting on the caps and are embedded in and flush with the concrete deck. All electric power cables are carried in a trough which runs between the rails. The trough is covered with steel plates laid flush with the deck and has ample provisions for drainage. This arrangement provides easy access to the power cables and eliminates fire hazards from this source. Steel plates serving as fire bulkheads are placed every 50-ft. the full length of the pier. Openings for inserting cellar nozzles for fighting fires underneath the pier are provided in the trough, three between each pair of bulkheads. The fender system consists of oak piles and double oak fender chocks, all creosoted.

Notes of the Month

Liverpool as Port of Call for Japanese Liners.

After consultation with the Ministry of Communications, the Nippon Tusen Kabushiki Kaisya have decided that their vessels shall call for the present at Liverpool instead of London.

Harbour of Kalundborg Finance.

The Town Council of Kalundborg, Denmark, has decided to raise a loan of 600,000 kroner to cover part of the expense of the works in connection with the extension of the harbour, the total cost of which will probably be 1,450,000 kroner.

New Timber Storage Facilities at Manchester.

The timber trade at the Port of Manchester has lately received additional accommodation in the shape of a large timber storage shed adjacent to the docks. The shed is 600-ft. long by 60-ft. wide and is calculated to hold about a thousand standards of timber. The shed is served by rail and road communications.

Mersey Docks Board Election.

At a meeting of electors held in December the following retiring members were re-elected to seats on the Mersey Docks and Harbour Board: Sir Richard D. Holt, Bart., Messrs. A. Harold Bibby, D.S.O., W. B. Bibby, E. G. Brownhill, A. S. Chambers and J. H. Coney.

Manaos Harbour Finances.

The annual report of Manaos Harbour, Ltd. (Brazil), shows a profit of £1,001 for the year ended June 30th last, to which is added £7,385 brought forward from last year accounts, making an available surplus of £8,386. The property is stated to be in good working order.

Developments at Port of Cocanada.

The Government of Madras are reported to have sanctioned the expenditure of a sum of Rs. 1,80,000 on the construction of a new dry dock at the Port of Cocanada. Sanction has also been given for an outlay of Rs. 69,000 on the reclamation of areas for the construction of wharves at the same port.

Temporary Sea Defence Work at Lowestoft.

The Town Council of Lowestoft is undertaking, at an estimated cost of £4,542, the construction, at the base of the cliffs at Pakefield, of a revetment of concrete blocks as a temporary protection for the cliffs from further storm damage, pending the preparation of a scheme of permanent works.

Clyde Navigation Trust.

At a special meeting of the Clyde Navigation Trust at the end of November, Mr. William Cuthbert was appointed chairman in succession to the late Mr. William F. Robertson and Mr. J. H. Maurice Clark, vice-chairman. Mr. Cuthbert has been a member of the Trust since 1919 and has occupied the position of vice-chairman, which he vacates, since 1930. Mr. Maurice Clark, who is a well-known Glasgow shipowner, has been a member of the Trust for the last two years.

Leith Harbour Extension.

At a recent meeting of the Leith Dock Commission it was stated by Mr. John A. Lindsay, the chairman, that about 70% of the work embraced in the present contract for the extension of the harbour had been carried out. Operations had been slowed down, partly through restriction of lighting during hours of darkness, and partly through Admiralty restrictions of navigation in the Firth of Forth.

Mersey Port Staff Appointments and Changes.

Mr. R. J. Hodges, Assistant General Manager of the Mersey Docks and Harbour Board, has been appointed Deputy General Manager and Secretary. Mr. Hodges entered the service of the Board in 1935, having previously been a director and manager of the Anchor Line, Ltd.

Capt. G. A. A. Bingham has retired from the position of Dockmaster at Waterloo and Princes Dock, Liverpool, after 30 years' service with the Docks Board.

The New Jetty at Durban.

Seven hundred lineal feet of caissons to form the Western side of the T-shaped jetty in Durban Harbour have been laid in position, according to information recently received from South Africa. The jetty, which will be the first of the T type at Durban, will be approximately 2,000-ft. long by about 750-ft. wide. It will be surmounted by five cargo sheds, four of which will have a length of over 600-ft. and a breadth of over 120-ft. The fifth shed at the end of the jetty will be slightly smaller. Together with the two deep water berths and their sheds, 420 and 500-ft. long respectively, the new jetty will provide accommodation for nine or ten extra sheds. The equipment includes eleven 4-ton high speed cranes and a 10-ton crane.

Barry Pilotage Authority.

Messrs. E. V. Swallow, dock manager at Barry and J. L. Peterson, dockmaster, have been elected to the Barry Pilotage Authority as representatives of the Great Western Railway.

Closing of Stockholm Harbour.

By reason of the laying of a minefield in the Baltic to the South of Stockholm, the harbour of Stockholm has been closed to navigation by the Swedish authorities.

Aberdeen Harbour Commission.

At a special meeting of the Aberdeen Harbour Commissioners, Sir Andrew Lewis and Messrs. John Spencer, John Walker and M. H. Williamson, were re-elected to seats on the Board.

Disposal of Malayan Floating Dock.

It is announced that the 5,000-ton floating dock at Sabang, Malaya, formerly belonging to the Sabang Bay Harbour and Coal Company, has been sold and is no longer available for ship repairing purposes.

Shipping at Indian Ports.

British and foreign shipping at Indian ports is stated to have been little affected by the war. In August the total number of entrances and clearances was 607. In September, the first month of the war it fell to 501, then in October it recovered again to 659. The latest return to hand up to November 25th was 594.

New Port near Stolpmuende.

The new port on the German Coast near Stolpmuende is being pressed forward to completion, in order to handle shipments, including, if necessary, military transports, for East Prussia. It will serve as a relief port to Stolpmuende, which is to-day Germany's third largest naval port. The cost of the undertaking is estimated at 40 million marks.

Prospective Port Improvements at Naples.

Certain new features are projected for execution in the near future at the Port of Naples, including the construction of a special basin for the discharge of fuel oil, and a new quay of the same height as the existing embankment. The Duca d'Aosta breakwater is to be extended for a length of 325 yards. It has also been decided to complete the installation of hydraulic plant at the port.

New German Canals.

It is announced that the Adolf Hitler Canal which connects the River Oder with the town of Gleiwitz in Upper Silesia, has been opened to traffic. Work has now been commenced on a new canal, 200 miles in length, to connect the Oder and the Danube between Cosel and Vienna. It is designed to facilitate the transport of coal from Upper Silesia to the South, and will form the last link in a chain of waterways from the Baltic to the Balkans.

New Soviet Reinforced Concrete Dock.

A floating dock of reinforced concrete construction has just been completed at the Port of Odessa for the Soviet Government. It has a lifting capacity of 6,000 tons and is intended for the inspection and repair of the under-water parts of hulls of sea-going vessels. The length of the dock is 426-ft., its width 100-ft. and it has a height of 48-ft. It is equipped with up-to-date appliances, including a boiler installation, electric welding apparatus and compressor plant.

Increases in Port Charges.

Increases in wages of dockers and stevedores are being reflected in corresponding increases in port charges. At nearly all ports in this country and on the Continent announcements are being made that rates are rising. The London Midland and Scottish Railway state that the charges for various services at the Garston Docks are being increased by 8%. Similarly, an increase of 7½% is notified by the Ardrossan Harbour Company. Other instances might be given to an indefinite extent.

The Port of Cork and the War.

The Port of Cork is feeling rather heavily the effects of the war, and a special conference of city and county authorities, including representatives of employers and workers' organisations, was held early in December to consider what steps could be taken to deal with the situation. Mr. S. Fitzgerald, the chairman of the Cork Harbour Board, stated that the harbour revenue had fallen by £4,000 in the past three months, by reason of the suspension and curtailment of shipping services. It was decided to appoint a co-ordinating committee, representative of all local bodies, for the purpose of "maintaining the port and supporting the services that remain by insisting that all traffic be routed through the Port of Cork."

*Tidal Models of Rangoon and Cheshire Dee Estuaries**

Discussion on Papers by Mr. OSCAR ELSDEN and Mr. JACK ALLEN.

Sir Leopold Savile, Vice-President, wished to express his regret that his senior partner, Sir Alexander Gibb, Past President Inst. C.E., has not been able to be present that evening, because Sir Alexander was particularly interested in the model and had really been responsible for recommmending to the Rangoon Commissioners that they should deal with their problem by means of a model. It would be generally admitted that Sir Alexander had taken a bold step in embarking on a model-experiment involving the expenditure of about £10,000 at a time when the advantages to be obtained by such an experiment was considered by many engineers to be very doubtful. That Sir Alexander was justified in his decision would be clear, as in spite of the fact that the navigable depth of the channel had been growing less for many years, it had been possible to advise the Commissioners, as the result of the experiments, that the deterioration would appear to have reached its limit, and that there was a reasonable prospect, without any large expenditure being undertaken on walls or dredging, of the conditions improving, or at any rate not deteriorating any further. That that advice had been justified so far would be borne out by Mr. J. Guthrie Brown, M. Inst. C.E., later in the discussion.

It would no doubt be realized that the results of the model-experiments could not have been obtained but for the work done on models by Professor A. H. Gibson, M. Inst. C.E., and others. It was due to the work that Professor Gibson had done and to the generous help that he gave that it had been possible to take advantage of the practical problems which he had already solved and to develop the model in the way that had been done. In addition to the experience gained in former work on models, reference should also be made to the enormous amount of work which had been entailed on the part of the technical officers of the Rangoon Port Trust, because it would be readily realised that a large amount of data and a great many observations had to be obtained and made; Mr. W. D. Beatty, M. Inst. C.E., the Chief Engineeer of the Rangoon Port Trust, and his engineering staff, and Commander C. M. L. Scott, R.N. (retired), Deputy Conservator, and his surveying staff, were to be congratulated on the manner in which they supplied all the requirements under what were very often exceedingly difficult and hazardous conditions.

Last, but not least, Sir Leopold wished to record the great appreciation of himself and his partners of the fact that the Governing Committee of University College, London, had placed a large basement at the disposal of the Rangoon Port Commissioners, and that Professor E. G. Coker, M.Inst.C.E., and later Professor G. T. R. Hill, of the Faculty of Engineering, and Professor F. G. Donnan and Mr. Henry Terrey, of the Faculty of Chemistry, had rendered most valuable assistance. It was only right to record that the satisfactory results obtained would not have been possible without the assistance and advice which had been received.

Mr. G. J. Griffiths remarked that he would confine his remarks to Mr. Allen's Paper. He had always considered that sooner or later there would be a controlled channel extending downstream some considerable distance below Connah's Quay, and he was very glad to see that the matter had been so thoroughly investigated. At the same time he would like to utter a warning in regard to the results of the model-tests, particularly from the point of view of the erection or forming of training walls. The sands in the Dee estuary were very unstable, and great care would be necessary to ensure the stability of the foundations of the training walls. It might also be possible to construct groynes at right-angles to the training walls, and hence gradually to reclaim the whole of the foreshore.

The Paper showed how valuable the use of aerial photography was in surveying an estuary of the kind in question, and in fact for all classes of work. He had not the time to consider all the details of the various schemes which Mr. Allen had investigated, but from a wide experience of both the Mersey and the Dee estuaries, he felt sure that those concerned were correct in not trying to keep the controlled channel too near to the Flintshire coast; he thought that it might be well that they should carry out additional investigations with regard to the width of the mouth of the controlled channel before they proceeded further into the matter, because that factor was all-important.

He agreed that a barrage would be useless. With regard to the training walls, he hoped that the southern wall would always be kept above the level of high-water spring tide, its extensions being gradually followed by those of the northern wall, also kept above spring-tide level, so as to assist in the reclamation of both foreshores.

Captain G. A. Wright said that he was the instigator of the investigation of which Mr. Allen had given such an interesting account. The lack of financial resources had prevented the River Dee Catchment Board from carrying out an instrumental survey of the Dee estuary and it could, therefore, be said that the Board's poverty had resulted in the study by Mr. Matheson of plan-projection from obliquely-taken aerial photographs, and subsequently in the construction of the model described by Mr. Allen from the survey prepared in that way. He wished also to point out that, although the river was called the Cheshire Dee, only 5 miles of its course lay in Cheshire, the remainder being in Wales or forming the boundary between Wales and England.

Mr. Oscar Borer said that he was particularly interested in the size of the bed-material chosen for both the models described in the Papers. In the case of the Rangoon model, he noticed that Mr. Elsden stated that the grain-size was approximately three-quarters of the size of the material found in nature, a proportion which Mr. Borer had found to be fairly satisfactory. What size sand had Mr. Allen used in his models?

In the Rangoon model silt was introduced in suspension. Since the banks were referred to as being alluvial, presumably some form of alluvial silt was introduced. In Mr. Borer's experiments alluvial silt had been introduced, but had produced a very bad effect; when that came down with the fresh water and entered the salt-water portion, representing the sea, there was at once coagulation of the material and it settled on the bed, so that after the first few tides—a matter of a few months in natural time—the whole of the bed coagulated. He would be interested to know whether any effect of that kind had been found in connection with the Rangoon model.

Mr. Allen stated that no silt in suspension was supplied to the model of the river Dee. He assumed that the Dee carried silt only at certain times, and that therefore the investigations had been confined to the movement of the bed itself. It sometimes seemed to him that discussions in regard to silt in suspension did not lead very far, because, after all, if material were in suspension, it did not matter whether or not it moved up and down the river; and he thought that Mr. Allen had discussed the problem correctly; it was with the movement of the grains of sand along the bed that the engineer was concerned.

Mr. Allen had used a second model, and Mr. Borer thought that that had gradually come to be the practice with regard to tidal models. At the Poona research station three models had recently been used when dealing with tidal problems. It was not possible to be quite sure that one model was going to give the exact results, and since there was a great sum of money involved in the actual works, it was desirable to check the results by means of a second model.

On page 11 (November issue) Mr. Allen referred to a strong ebb current impinging on the foreshore seaward of the walls, the current being apparently induced by the construction of the walls themselves. That was an effect which might be expected, because if an attempt were made to divide an estuary artificially by putting in high training walls, there was sure to be some portion of the estuary which would not receeive its proper amount of tidal water, and therefore a cross current would be bound to be set up in the endeavour of the tidal waters to restore equilibrium throughout the whole estuary; the inevitable result of that, especially with high training walls, would be to set up a flow behind the walls. He knew that the experiments with regard to the Dee walls had not continued for a very long period of time, but from what he could see of some of the soundings that were given, there seemed to be a tendency for a scour to be set up at the back of the walls. If that were so, it would make the construction of the walls exremely difficult. Such a tendency was natural, moreover, since, as the water was coming off from the estuary and could no longer find its way into the channel into which it naturally flowed, it naturally flowed against the only obstruction which could possibly bear against it, and so gradually the water from either side of the training wall would tend to flow outside it. If the channel were partially filled with silt, however, there would probably not be

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Tidal Models of Rangoon and Cheshire Dee Estuaries—continued

much tendency to scour it clear again. The construction of the training walls would in any case not be easy.

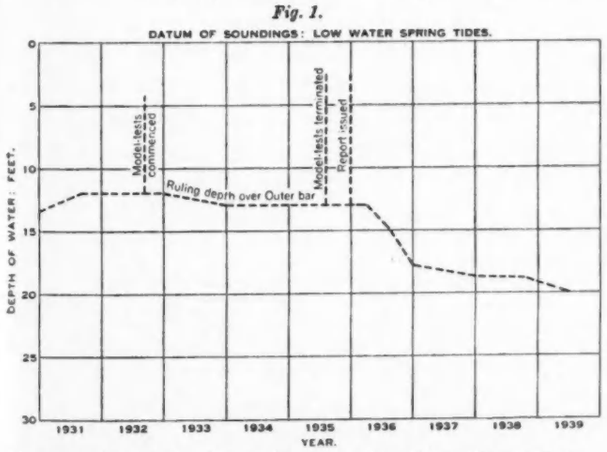
He wished to make a brief reference to the use of the barrage. Mr. Allen referred to the fact that a hole appeared below the barrage, apparently suggesting that the fresh water was held up, and said that it was discharged in the lower part of the ebb. If the gates were only partly opened, so that there was a discharge underneath them, with an artificial head, local scour was certain to occur, with a great deal of shock through the head of water being discharged into the area below. If, however, as soon as the level at which it was desired to operate the barrage (perhaps 1 or 2 feet below the impounded-river level) was obtained, the gates were opened fully, local scour was no longer created; the surface-slope of the whole river would be steepened, and the effect would therefore be very different from that of leaving the gates partially closed and thereby inducing local scour. A great deal of investigation would be involved if there were to be any hope of a barrage being at all successful on the river, and he would be interested to know whether or not the Author had attempted to see what would happen if he simply made use of the water stored behind the barrage to create a greater head, and therefore a greater surface-slope, which would have an effect for some considerable distance below the barrage itself.

Mr. J. Guthrie Brown observed that the Rangoon model was based on the principles brought into the realm of practical engineering by Professor A. H. Gibson, M.Inst.C.E., in recent years. It was doubtful whether a model had ever been used before to deal with such a large number of variable factors, and with so little information at the start with which to allow for them; at the time it was the largest tidal model to be constructed in Great Britain.

The behaviour of most models was extremely temperamental, especially in their early stages, and there were many initial difficulties to be overcome in the Rangoon model. The extensive problems which had had to be solved were very well described in the Paper, and satisfactory information had been obtained on all the unknown factors. The confidence felt in the accuracy of the model in foretelling the future enabled Sir Alexander Gibb to indicate, as a result of its operations, that the conditions at the bar, which had suffered as the result of deltaic degeneration of the river mouth, with consistent loss of navigable depth, for the greater part of a century, would appear to have reached their climax. The Commissioners, who had contemplated as an essential requirement an extensive and expensive system of river-training, were advised that any such expenditure would be worse than useless, that a policy of masterly inactivity was all that was necessary, and that the conditions would become no worse and would in all probability improve. Such advice would have been inconceivable without the guidance of the model, and it was gladly accepted by the Commissioners. Whilst that was most gratifying to those concerned with the model, what was even more encouraging was that the conditions had improved as forecast by the model.

The first reasonably detailed chart available of the river mouth was dated 1860, when there was a ruling depth over the bar of 24-ft. at low water spring tides. This depth continually decreased until in 1931 the depth available was only 12-ft.; the model-

Fig. 1.



RANGOON OUTER BAR: RULING DEPTHS AT LOW WATER SPRING TIDES.

experiments were then commenced. Fig. 1 above shows the depth of water over the bar during the last 9 years. There had been a period of 3 years, during which the model was operated, when the 12-ft. ruling depth was still about the same. Up to that time there had been no justification for hoping for an improvement. The model-results, however, indicated that the conditions would, in fact, improve, and in due course they had started to improve; the results had proved the accuracy of the forecast, because up to date there was a ruling depth of 20-ft. over the bar, there having been a gradual and continuous improvement.

Mr. J. M. B. Stuart said that on page 324 (September issue) of Mr. Elsden's Paper were given some of the possible causes of the trouble at the outer bar. No. (3), "Silt brought down by the other mouths of the Irrawaddy and washed eastwards by tidal streams," and No. (5), "Changes in the tidal streams due to widening, straightening, and other changes in the Rangoon river mouth," were probably the most important factors; No. (3) was probably a more or less constant factor over a number of years, whereas the changing factor was No. (5).

The purpose of the model was to find the cause of the growth of the outer bar and to ascertain whether or not anything could be done to improve conditions there. There were apparently no questions concerned with the Rangoon river itself to be investigated by the model, and, whilst there might have been good reasons for what had been done, it seemed to him that it might have been possible to have dispensed with the labyrinths of the Panhlaing and Pegu rivers and of Pazundaung creek, and to have had one combined labyrinth for the Rangoon river and the channels which ran into it at the upper end of the Hastings shoal. That would have simplified the model-arrangements.

On page 327 (September issue) it was stated that provision was made in the case of the Sittang labyrinth to reproduce the effects of the Alok cut, which was a cut-off which shortened the course of the river by between 30 and 40 miles. On page 325 (September issue) the Author seemed to have gone away from the idea of representing things accurately as they happened in the Sittang river, because it was there stated that only one-half of the calculated discharge was supplied to the model, it being considered that only half the actual river could be said to flow into the modelled area. He would like to know why those comparatively small channels, such as the Twante canal and the Bassein creek, were included in the model; they could hardly have any effects on the problem under investigation.

The mouth of the Sittang river oscillated from side to side over periods of time. During recent years there had been an accretion on the east side of the Gulf of Martaban, and erosion on the western side of the mouth of the river. It was possible that those changes in the gulf and the coastline might have had some effect on the increase in height of the Outer bar. Great trouble had been taken in the model to give special consideration to all the rivers that entered the area, but it seemed to him that the coastline and the changes in the gulf could have been considered only very vaguely in the model.

On page 354 (October issue) the final decisions were mentioned. The Rangoon Port Commissioners apparently accepted the advice of Sir Alexander Gibb and Partners and did not carry out any dredging, and they were wise in so doing, but it was rather doubtful whether there was any necessity for them to announce that in future Rangoon would be only a second-class port, because from what Mr. Guthrie Brown had said it would appear that the conditions were now much better there than they had been. It was unwise for the Commissioners to say that they could not take any vessels drawing more than 28-ft. of water. At that time—1935—Rangoon was only a port for Burma, but in view of the war in China it was now a port for western China also, and might be of greater importance in the future than it had been in the past.

Mr. John McClure observed that it would be of interest if Mr. Elsden could explain what provision had been made in the tidal mechanism for producing the natural period of rest, varying from, say, 20 to 30 minutes at high and low water, as such periods of rest had an important effect on the deposition of the silt. The peaks of the model tidal waves in the diagrams shown in Fig. 8 (page 351, October issue) seemed somewhat sharp, and would indicate a lack of still-water periods.

After three years of model-investigation, the final decision reached had been to permit present conditions to remain and to limit the future draft of vessels using the port, which seemed somewhat disappointing; in that connection it would be of interest to know whether any model-experiment has been made with the proposed dredged channel shown in Fig. 9, using half-tide banks to form a funnel entrance to the cut. Clay seemed to be available for the purpose, and the advantage of using clay was that if, shortly after the commencement of the cut, it were found that no good purpose was being served, it would be quite easy to dredge it up again, whilst if the effect of the channel were really satisfactory it could be made more permanent. In a similar case of a long dredge and curved entrance-channel with which he had been concerned, such a hard clay funnel-mouth bank had been formed, with very good results in the maintenance of the channel, and afterwards it had been improved with rubble on the channel side to render it more permanent.

Referring to Mr. Allen's Paper, he wondered whether any experiments under scheme E had been made, especially on ebb tides, by actually forming a channel. Had any experiment been made by drawing the sand aside and inducing the channel to

Tidal Models of Rangoon and Cheshire Dee Estuaries—continued

avail itself of the ebb flow which was referred to? If in the model any advantage had been found from that experiment, it seemed to him that it would not be very difficult, with a big sand-dredger depositing sand from that channel (not the full depth at once), to introduce it, with the proviso that the sand which was dredged from the cut had to be introduced under water-level at the banks, and not above water-level. If that were done, it would be found that the sand would stay there, and would probably not be readily carried away by the currents.

Mr. J. L. Matheson remarked that the great complexity of the regime in the Rangoon estuary and the various points which had been taken into consideration, such as silt and coast-erosion, contrasted with the comparative simplicity of the Dee estuary, which was almost free of silt, so that it was not necessary to introduce it into the model.

That contrast between the two models was reflected in the tide-curves. The Rangoon tide-curves showed a slight divergence between those of the model and those actually obtained in the estuary, no doubt due to the great variety of influences which affected the Rangoon tide. On the other hand, the tide-curves of the Dee showed an almost exact agreement between the tide in the model and the tide in the estuary.

Turning to the question of the Dee, he showed two lantern-slides which illustrated the regime in that river. A survey of the Dee in 1732, which had been made by the opponents of the scheme of training walls, showed that the deep-water channel clung to the north shore of the estuary. The training walls had been constructed about 1750 and deflected the channel to the south shore, but seaward of the walls the channel reverted to the north shore near Parkgate, Fig. 1, page 8 (November issue), which at that time was a port of some importance. That tendency of the river was shown exactly by the model itself, and it was interesting that every attempt which was made to restrain it on the south side met with considerable opposition from the river itself, which tended to revert to its old course along the north bank. It was also particularly interesting to notice how the S-bend in the river near Parkgate, which had been shown on some of Mr. Allen's lantern-slides, was developed in the model with remarkable accuracy.

Mr. Ll. E. Williams, Assoc. M.Inst.C.E., had found the speed of the bore in the river between Connah's Quay and Chester to be 8 miles per hour. The speed in the model, when converted to full-scale units, was 7.94 miles per hour.

Mr. G. A. Maunsell had taken part in a preliminary investigation into the problem of the Rangoon Outer bar. That investigation had comprised both a study of old records and an examination of the actual conditions near Rangoon, where he spent several weeks in 1929. As a result of that investigation the conclusion had been reached that training banks offered very little prospect of success within reasonable limits of cost. He was, therefore, very interested to see that the third stage of the model-experiments described by Mr. Elsden—namely, the attempts to see the effect of training banks in a model—showed that the conclusions reached from the preliminary investigations were sound.

Mr. Elsden also mentioned the very interesting fact that the mouth of the old Rangoon river might possibly have followed quite a different course about 200 years ago. That was the conclusion that had been reached as a result of the examination of old records. Such a change in course was not inherently unlikely in that neighbourhood, because the whole district was a vast natural laboratory where great changes in the river regime were going on at an extremely rapid rate; for example, in the Sittang river, a little higher up the Gulf of Martaban, there was a pronounced bore, and within living memory a big cut-off had occurred whereby a 40-mile length of fairly wide estuary had been eliminated.

Mr. Elsden found that it was impossible to find a material which would produce the effect of erosion in the model, and he described how, at intervals during the experiment, he used to pare away by hand banks which were eroding in practice, whereas the model by itself was capable automatically of producing the silting effect by accretion. Mr. Allen, on the other hand, was able to produce the effect of erosion as well as of accretion in his model, and it had been mentioned that the model of the Dee was a very much simpler problem on account of its being just a matter of a fresh-water discharge combined with and the flux and reflux of tides over a large sandy estuary, whereas in the Rangoon model there were two different kinds of accretion going on, the accretion of sandbanks rolling down the river-bed and accumulating just at the mouth of the river, and the accretion due to siltation. To what extent in the reproduction of the natural accretion in the Rangoon model was it possible to discriminate between the accretion due to sandbank formation and the accretion due to silting? Was it possible in the model to produce both sandbanks and mudbanks? The bar itself, which extended about 6 or 7 miles out to sea, consisted of a huge flat expanse of very soft mud. Just outside the mouth of the Rangoon river, where the river channel was itself very deep (that was to say, nearer inshore than the great mud bar mentioned above), the river had piled up enormous banks of sand on either side of its channels. Those sandbanks were of a firm compact description, and great expanses of them were exposed at low tide. The bottom of the river-channel in the Rangoon river itself were almost everywhere composed of sand or gravel. There were deposits of fine silt in backwaters of the channel and the banks of the channel were mudbanks which had been cut through by the river and which were being eroded in many places. The bottoms of the active channels were, however, almost invariably covered with sand. Mr. Maunsell therefore came to the conclusion that there were two totally independent sources of accretion, the one being sand which was rolling or drifting down the bed of the river and which was ultimately finding a resting place in the sandbanks formed near or just outside the mouth of the river, and the other being a very fine argillaceous silt which was being deposited everywhere over the whole bottom of the Gulf of Martaban wherever the movement of the current was sufficiently sluggish to permit deposition to take place. For many miles off shore the water in the Gulf of Martaban had the appearance of very thin pea soup, caused by the presence in the water of that impalpable silt, brought down partly by the Rangoon and Sittang rivers but mainly by the great rivers draining from the central Asian mountain plateau, namely the Irrawaddy and the Salween.

The problem of the Outer bar at Rangoon was quite evidently a case of silt-deposit from the silt-laden waters of the gulf, and he assumed that Mr. Elsden's model-experiments were mainly directed to reproducing that silt-deposit. However, the fact should not be lost sight of that the other deposit of sandbanks just inside and just outside the mouth of the river itself, was quite a separate phenomenon which was going on all the time, and which probably exercised a determining influence upon the direction of the channels at the mouth of the river and to a large extent regulated the erosion in the banks of the river at Elephant Point and elsewhere. Had an attempt been made in the model to reproduce that sand phenomena simultaneously with the reproduction of the silting phenomena upon the Outer bar?

Mr. Maunsell wondered if Mr. Elsden wished to qualify his statement that the model-experiments were based upon empirical formulas originally devised by Professor Osborne Reynolds. It appeared that the use of the word " empirical " might give the impression that there was no basis in mathematical first principles for model-experiments.

Did Mr. Elsden consider that it would be possible to make model-experiments reversible? That was to say, starting with present-day conditions in the tidal estuary, would it be possible to devise tidal movements which would in effect run backwards in time, and which would reproduce conditions of erosion and accretion in the reverse order so as to finish up with the state of the estuary such as it did in fact occupy in time past?

(To be continued)

Shipping Traffic at Hull

Feared Diversion

The Hull Chamber of Commerce and Shipping have been in communication with the Ministers of Shipping and of Transport, making representations on the danger of diverting shipping traffic from the Port of Hull. They urged that nothing should be done to injure the permanent interests of the port, consistent with naval and military exigencies.

At a meeting on December 5th, responses to the memorial were reported. The Minister of Shipping, Sir John Gilmour, replied that he "has taken note of the terms of the resolution, and is fully alive to the interests of East Coast ports." The Ministry of Transport replied, stating that diversion of a vessel was not lightly directed. "Those with whom the responsibility rests are fully conscious of the results both to trade and industry and to the port from which the cargo is diverted. Moreover, in the case of Hull, we realise the repercussions of diversion on the inland waterways, which depend so largely on the trade of the port. On the other hand, the Chamber will realise that the national interest demands that unnecessary risks to ships and cargoes shall not be taken. No diversion is ordered except as a result of advice received from those sources whose business it is to assess the risks of enemy action."

The President of the Chamber, Mr. L. L. Gordon, said the replies were encouraging. There were those who feared that with the outbreak of war Hull might be closed. There was never any such intention, and, with the hoped-for and expected elimination of the mine menace, there seemed no reason why they should not carry on their normal trade. War or no war, Hull, he said, must strive to increase its export trade.

*Duties and Responsibilities of Ports**

By J. F. MARIAS, President, State Board of Harbour Commissioners, San Francisco, California.

The very first fact to accept in discussing the duties and responsibilities of ports is that port functions are public services no more and no less. This principle applies whether the operation is by the state, city, port district or by private operators. Generally speaking, port facilities are the connecting links of a stationary character between two mobile systems. Being a link, it is essential that its functions be highly efficient and economical. It is the right of the public to demand, and therefore receive, the highest type of services.

Duties to Hinterlands

It is the duty of every port to meet the demands of the commerce naturally tributary to it. It is not a question of whether or not the handling of that commerce is a paying operation to the port itself so long as it means the development of commerce for the tributary area. This does not mean, of course, that the port facilities are to be subject to every and any kind of economic plan. It means that the port has no choice in the matter when business is sent through it that will mean much to the hinterland. There is, therefore, a vast difference between ports. There are ports that give a full and complete service and those that give but a partial service. There must be a definite division between ports in this respect. In the first class, the major ports, complete facilities **must** be provided. In the second class, the minor ports, provide only that which their limited space and financial ability permits. Usually the business that the minor ports do is either a part of the major port's former business or specialities in bulk movements such as lumber, grains and the like.

View of San Francisco Water Front.

Competition to be Barred

Since all ports should be developed solely for the purpose of rendering a public service, there must be no competition. The rendering of a public service in port operation may be compared to the providing of water to a city. There must be no competition. It is a public necessity. As the servicing of the water system relates to a city, the port service relates to the tributary district. Any competition in a public service only increases the costs of handling the commodities and that is essentially wrong.

We all know that there is a definite movement towards Federal control of all ports. Why? Well, my reply would be that this move is considered necessary because there has been too great a departure from the true intent of port duties; or in other words, too much competition where no competition should prevail. Whether we agree with Federal control or not, we are certainly being forced into considering it. We should then ask ourselves if we have made such economic errors as are responsible for this movement.

Distribution Costs

I am personally convinced that the weakest part of our national economy is our distribution system. True enough we have the Interstate Commerce Commission and the United States Maritime Commission, and the various intra-state Commissions to regulate our distribution, but even with all of these regulatory commissions, we are far from perfect and there is still much to be desired in distributing our products domestically and our surpluses internationally. We still find it too costly to distribute all of our production to our own consumers at the prices that our consumers can afford to pay and at which our producers can afford to sell. There are too many costs, or charges, by the units in between the producer and the consumer. Among these units, we, the port authorities, are one. The economies that apply to us, will also apply to the other units in between the producer and the consumer. Since we—state, city or district authorities—operate with profit, we might, with pride, pat ourselves on the back and say that our unit is not one to be criticised. We may point our fingers of righteousness against all of the other units but if we do, we are not serving as we must.

As a part of that great distributing system, we must individually and collectively, do something to improve our services and one of the best places to start is to reduce so-called competition, especially if it comes under the heading of the unnecessary duplication of services and facilities. In recent years, the various cities, by their Chambers of Commerce and other civic organisations, have striven to show some kind of supremacy over other cities by showing the superiority of their ports, printing voluminous statistics, figures of tonnages, etc. About the only good these statements have done is to make the people port-minded. Were it not for such publications, I fear that too many people would neglect port considerations entirely. I claim that ports are too important to be neglected. As to the published figures, they have but little meaning. I do not suppose that there are ten persons to a thousand that know the difference between a cargo ton and a net registered ton. Still, I have seen some mighty weird statements based upon one or the other, and frequently on both, without care as to the difference. In order to explain what I mean, I might cite an example and name two ports so often compared. I refer to Los Angeles and San Francisco. So far as San Francisco is concerned, we have no quarrel with Los Angeles at all and I believe the same is true about Los Angeles. Strangely enough, we who handle the affairs of the ports are the very best of friends. There is none among us who does not co-operate with the others, such as we are doing right at this time. If there is anything that any other port in the United States wants from us in San Francisco, they can have it cheerfully. And we receive exactly the same kind of treatment from them. Then, who is it that gets all excited about the relative merits of one or another port? Far be it from me to criticise any organisation but most certainly the rivalry, so-called, exists only in the fertile brains of people less conscientious of the co-operative spirit than those of us directly connected with port work.

If any of us were placed in the position of finding a natural outlet for the handling of the farm products, let us say, of a great producing area, we would most naturally explore all natural bays and harbours as close to our production as possible. Once found, we would develop the facilities as demanded by the commodities we were charged with shipping. The development of the harbour would depend entirely upon the needs of the producing area and that producing area would demand the most efficient facilities to be operated in the most economical manner. Well, gentlemen, that is all there is to it. That is exactly the way we should operate to-day. We must do nothing more than furnish the efficient and economical means for the handling of the production of farm and factory tributary to us.

*Paper read before the Pacific Coast Association of Port Authorities at the Twenty-sixth Annual Convention, Oakland, California, August, 1939.

Duties and Responsibilities of Ports—continued

Analogy of San Francisco and Los Angeles

Getting back to the comparisons between Los Angeles and San Francisco, perhaps I can illustrate my meaning. Let us take San Francisco first because it is the oldest port. It was discovered in 1775, which, by the way, was quite a year for young America. Spain had a pretty good grip on this part of the world. She realised that its development would mean much to her. She already knew of its productivity and had mighty reasonable ideas about the potentialities. This country was producing grain and raising cattle. Russia, England and France had their eyes on this attractive district but in 1841 the first American warship, the sloop " San Luis," sailed into San Francisco Bay and the " Portsmouth " belched her 21 guns of salute as San Francisco was transformed into an American city from a Mexican pueblo. From that time on, this bay became the most important point on the West Coast of North America. Because of the rich lands of the two great valleys, the Sacramento and and San Joaquin, the port grew and grew. Because of these developments, the transcontinental railroad was developed. In every case, the developments were made to meet the demands of the commerce. And they should be continuously made for the same reasons and no others.

Pier No. 23, Port of San Francisco.

Los Angeles was another Mexican Peublo. There was nothing much developed around there. However, as San Francisco became important, explorers became more interested in other parts of California and soon Los Angeles was on her way to becoming one of the great American cities. It was, however, many years before people realised that nature had also endowed her with wealth beyond imagination—" Black Gold "—oil was discovered. With this discovery, plus a climate of great attraction, Los Angeles became the fastest growing district the world has ever known. With her growth came the demands for a harbour, a most natural demand. But this district had no natural harbour such as San Francisco Bay, so with the energy that is hers, she built a grand one which is to her great credit. As the ships of long ago came into San Francisio Bay for the products of her hinterland, so did ships go into Los Angeles for her products. And naturally as the ships came into Los Angeles Harbour for her products, they took into the harbour the things that Los Angeles consumed. That is the most natural kind of development. What then is there that Los Angeles is taking away from San Francisco, as some would have us believe? Los Angeles Harbour serves its needs and San Francisco Harbour serves its needs. Los Angeles and the hinterland will demand that its harbour provide at all times the facilities that are required for her economic development, no more and no less, and San Francisco will do the same. It is to the interest of both that they expand and become more efficient because they serve all the hinterland that is tributary to them.

I hope that I have, by this comparison, emphasised the all important points, namely, that every port must provide the facilities that the commerce demands, and secondly that the handling of the commodities across the docks must be the highest in efficiency and the lowest in costs, and thirdly that there is no such thing as competition.

Port Finances

When we speak of providing facilities, we must have available the finances to meet the demands and this is something that must eventually be worked out on a more equitable plane. I mean no criticism when I speak of the tax-levying authority of the port districts whether they be city, county or state. The fact still remains that the port serves not the immediate environs of the city, nor the bay, nor the district, but the entire nation. This is the phase of the port responsibilities as they relate to inter-coastal and foreign commerce. If America is to hold its own, and it will, as a maritime nation to regain the glory of its past, all major ports must be in the financial position to provide the facilities to keep abreast of the maritime development. Today, we are entering a new era of ship building. Soon we shall have much larger ships than we now have. These ships will demand proper facilities. The major ports will have to provide them whether they want to or not, or whether they have the money for the added facilities or not. Where is the money coming from? The answer has to be that the people whom these ships and ports serve must provide it and that means all the people of the country. Certainly there will not be enough revenue from the ships themselves to ever pay the costs of the new facilities. So what? The taxpayers will have to dig deep into their pockets and I do not see that you can limit this " digging " to the relatively small number in the close proximity of the harbours themselves. At the beginning I said that the thought was running around that we might have Federal control of all ports. I am not advocating it at this time, but it is certainly something to think over.

Port Tolls and Dues

I have said on many an occasion and I repeat it here that all the tolls on the docks and in the harbours must be at the very minimum. There is, as we all know, a movement well started in the North West to associate all terminals so that there will be some kind of general regulations for the common good. I am somewhat inclined to believe that such organisations are a good thing, but they have their weaknesses. Frankly, if the services at the ports are public services, not for profit, how can we agree on the regulation of charges if some of the facilities are privately owned and, therefore, must work on the profit basis. Do not misunderstand me. I am not opposed to businesses on the profit system. I am quite in favour of them, but I cannot see how the public service by the city or state and the private operators can come to any understanding because their bases are entirely different.

Also on this subject, I often wonder if it is quite fair to demand such rates as will give a profit on facilities that are recognised as economic errors. My contention is that if one port or another has made a bad investment, it is not entitled to the rate support of the other ports in order to make it pay. And, again, it is not right that the city or state port develop facilities and absorb losses year after year and then permit a privately-owned facility to take the business away from it after the business has grown to such proportions.

To sum up, then, the duties and responsibilities of ports I would say that since we render a public service, that service must be all that the designation implies.

We recognise that above everything else, we owe to all the people our most sincere efforts toward efficient and economic port management.

Since we must meet the demands of commerce by providing the proper facilities, we are not to be considered competitive.

Since we operate without profit, it is wrong to accept undue risk in building facilities especially if there are facilities available within the same port area. Such duplication serves only to divide the business and, therefore, increase the handling costs and probably demand a higher taxpayer contribution.

To be an important link in our great national and international distributing system, assuming leadership when necessary; the object being to assist the producer in delivering his products to the consumer at the lowest possible cost.

Never to be the obstacle between the producer and the consumer by inefficiency or excessive charges.

We who are in between the producer and the consumer, and I mean all of us, including the rail carrier, truck, stevedores, and all others as well as ourselves as terminal managers, have no right to exact from the product more than our share—we have no right to place ourselves in the position of determining whether or not the producer can sell to the consumer.

Duties and Responsibilities of Ports—continued

It is a definite part of our duty to make for such economy as will permit the producer to distribute more of his production.

Discussion

By J. W. Brennan, Port Director, Port of San Diego, California.

The suggestion of Mr. Marias's paper, "Duties and Responsibilities of Ports," I think is a little misleading. I believe it would sound better if it were "Duties and Responsibilities of Port Authorities." In my remarks I am treating the subject on a basis of "Value of a Port and Duties and Responsibilities of Port Authorities."

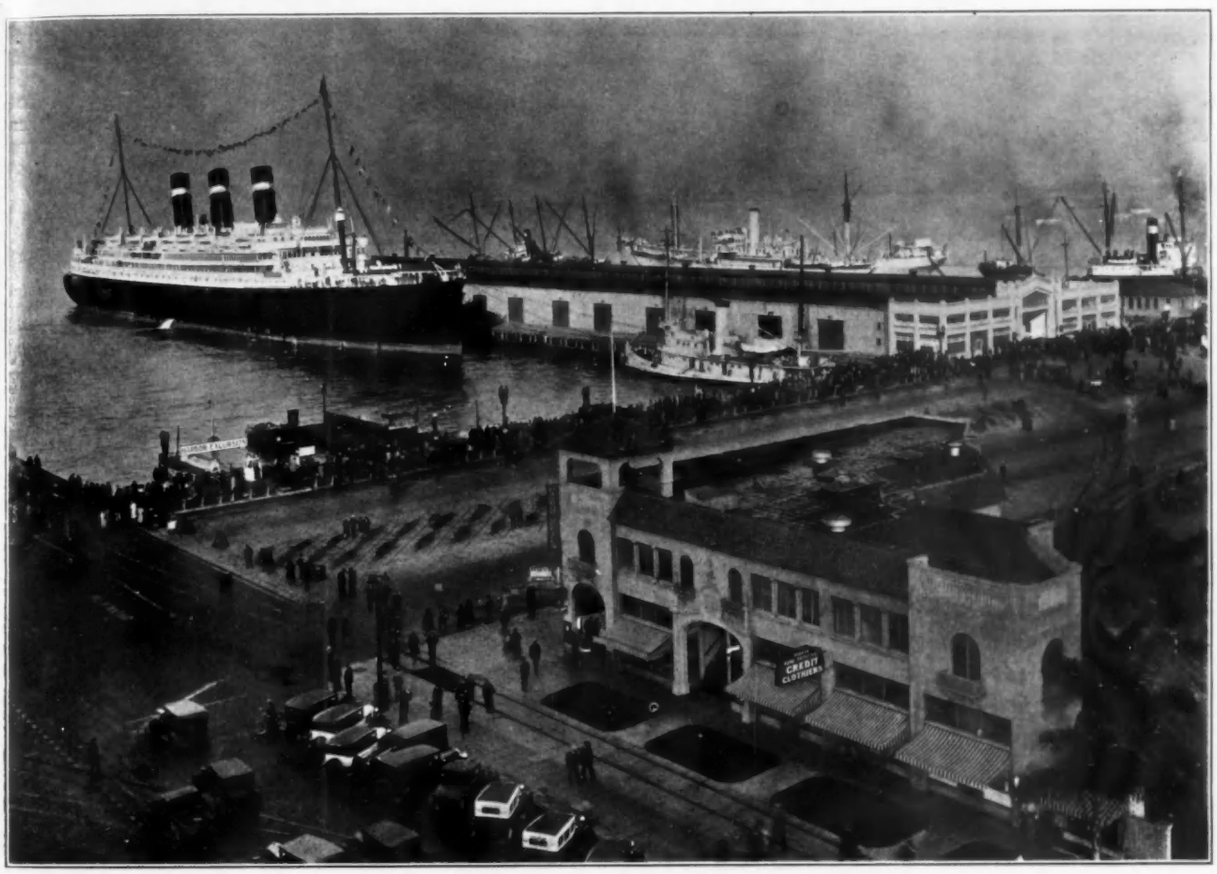
There is no time in our national life when the values of ports and the duties and responsibilities of port authorities is not a prime factor in our transportation system. International regulations are constantly developing and a single nation can no longer exist without foreign commerce. American markets circle the Globe and the United States is a lucrative market for all nations. Our foreign commerce, in the main, depends upon our domestic ports of interchange; and as I said before, the value of ports and the duties and responsibilities of port officials cannot be under-estimated.

Commerce of the United States

Let me cite briefly a few figures to emphasise the rapid progress that we have made in the handling of foreign commerce. The annual report of the Chief of Engineers, U.S. Army, shows during the calendar year 1921 our total import and export commerce amounted to 92,664,608 short tons. This traffic increased for the calendar year 1937 to 114,412,926 short tons. In other words, our total import and export commerce for all ports in the United States increased 23% from 1921 to 1937.

Now what happened on the Pacific Coast. The United States Maritime Commission, Division of Research, Annual Report No. 275, shows that United States Pacific ports located in Oregon, Washington and California, handled during the calendar year 1921 only 6,475,845 short tons of import and export commerce. However, in 1937 these ports handled 17,093,014 short tons of import and export commerce, or an increase over 1921 of 164%. **Let me emphasise this point: During the sixteen-year period our total import and export commerce for all ports in the United States increased 23% while the same type of commerce handled by Pacific ports increased 164%.** This to my mind, is impressive and indicates the value of ports and how important are the duties and responsibilities of port officials, particularly on the Pacific Coast.

In the domestic field, Coastwise, Inter-coastal and Inland Waterway service, we believe, offers the lowest economic transportation cost. Land transportation has in a measure been streamlined. Water transportation must meet this competition if they hope to continue to carry their share of tonnage. Here again the value of ports and the duties and responsibilities of port authorities are an important factor. Port facilities will probably never attain perfection, there will always be room for improvement. Conditions are rapidly changing and the cost of handling cargo at ports has increased. The necessity for labour-saving machinery is ever before us. The value of ports was never greater and it is our responsibility and duty, as port authorities, to keep pace with modern progress and maintain our port establishments at the highest degree of efficiency.



View of Municipal Pier at Port of San Diego.

Port Functions

Port functions are both physical and economical. Man, with all his genius, has not as yet invented a practical vehicle sufficiently amphibious to eliminate the necessity of transferring cargo at ship side between land and water carriers, and until there is no longer a necessity for transferring such cargo at ship side, port and port facilities will continue to play an important part in the handling of State, inter-state and foreign commerce. From an economical standpoint, ports should be self-sustaining. This, I feel, is a cardinal principle that should be attained if they are to justify their existence. To reach a self-sustaining port level, three vital factors are important:

First.—Uniform interpretations and application of regulations and charges for comparable services, especially for competitive port facilities.

Second.—Compensatory rates for services rendered sufficient to meet operation, maintenance and fixed charges when given normal tonnage commensurate with capacities of port facilities.

Third.—The source of Port Revenue should be distributed in accordance with services rendered.

I cite these three points because the port-plant is a vital adiunct to water commerce and the normal revenues should be sufficient to justify the capital investment, otherwise the value of a port to a community lies in savings in freight rates due to the existence of the port.

I have mentioned briefly the value of ports and the importance of port management with relation to domestic and foreign water commerce. The same situation is even more pronounced

Duties and Responsibilities of Ports—continued

with respect to the local community and territory that a port serves. It is conceded that the density of population in the United States lies in the territories served by or adjacent to water commerce. Water commerce and ports are synonomous, and the local community and the territory served by a port is entitled to enjoy the commercial heritage created by a port facility.

Necessity for Cheap Transportation

The reason for this is readily found in the economic necessity for low-cost transportation. Congressman Calmer, in debating S. 2009 in the House of Representatives on July 21st, hit the nail square on the head when he said " I point out to an intelligent Congress, that the very fact we have these waterways to furnish this cheap transportation, gives you a leverage—a club if you please—to hold over the heads of other forms of transportation to keep down the transportation charges." I think we all concur in this statement with respect to State, interstate and foreign freight rate levels and that it is the duty and responsibility of port officials to maintain and perpetuate this low rate-level insurance, by operating our facilities at a high standard of efficiency.

In principle, it affords an economic guarantee in the same sense as does the Sherman Act. It maintains and guards the fundamentals of competition. Were it not for our ports and water commerce, local communities and territories served by ports could not enjoy the low-cost transportation which now prevails. This low-cost water transportation is an economic necessity and is the greatest single factor in our domestic commerce that curbs rate inflation. Water carriers have opened markets for producers and distributors of commercial products that would not otherwise be available. Ports and water carriers offer producers a low-cost transportation and many types of commodities which could not stand the higher cost rail or truck tariffs, and permit economical competition. Every port has its local industries, many of them large ones, that are located at or adjacent to ship-side because of the economic low-cost transportation factor afforded by water commerce, and the life of many of these industries depends upon such transportation.

You are all familiar with the famous Pacific Coast Fourth Section application decided by the Interstate Commerce Commission on December 15th, 1932, when the railroads sought Fourth Section relief in Pacific Coast port-to-port rates because of water competition. Would the railroads have shrunk their rates voluntarily if water competition were not in existence at that time? The answer is definitely, NO. These depressed rail rates still prevail and they will continue so long as Pacific Coast ports and the threat of water competition exists. Therefore, if Pacific Coast ports serve no other purpose than to insure the lowest compensatory economic rate levels, they are of inestimable value to their local community and the territory served. They do a great deal more than that, however, they represent a vitally important transportation facility that is necessary to our local, State and National economic existence.

The value of ports and port facilities is vitally important to our commercial life; and the responsibilities of the officers vested with authority to maintain and operate these facilities are manifold. This situation is particularly true, on the Pacific Coast, with the prevailing trend of foreign commerce gradually expanding towards South America and Asia.

Summed up briefly, on our shoulders rests the responsibility of maintaining Pacific Coast port facilities at a high degree of efficiency. Larger and faster ships are on the Ways. Since the enactment of the Merchant Marine Act, 1936, the Maritime Commission have built, are building or are causing to be built, more than seventy modern ships. This is only the beginning of an ambitious programme to rehabilitate our Merchant Marine. Our ports and their facilities must keep pace with this progress and the responsibility to do so is a duty that we must not and cannot shun.

*Improvements at the Royal Docks, Port of London Authority**

Correspondence on Paper by Ralph Robson Liddell, M.Inst.C.E.

Mr. James Mitchell observed that the increase in height of the keel-blocks of the western dry dock (p 139†) was a much-needed improvement. It would greatly facilitate the cleaning, painting, and repairing of ships' bottoms, and would accelerate the drying of the plating after cleaning, and of the completed paintwork. Headroom was more important than ever, with the ever-growing increase in the beam of ships, and in the size and weight of plates requiring to be handled. Insufficient attention appeared to be paid to the increased cost of dry-dock work due to restricted headroom.

With regard to the tunnel-lining (p. 142†), the joint shown in Fig. 8 was very elaborate and costly. The lead grummets did not appear to be very suitable for their purpose. In addition to their own cost, they involved the counter-sinking of the bolt-holes. Although the segments were made to a tolerance of 1/64-in., the bolts had a clearance of 3/16-in., and if the whole or part of that were taken up by the holes not coming quite opposite to each other, the grummets would not fit. It was stated on p. 142† that the boltholes were drilled, but Fig. 8 showed them as cored. Which was correct? If they were drilled, was that method applied also to the counter-sinking? As it was necessary, apparently, to use a strand of red-leaded hemp, in addition to the lead grummets, it would have been simpler and cheaper to have relied entirely on annular rings of red-leaded canvas, as in a steam-pipe joint, where the conditions were generally much more trying. Although the edges of the flange-joints were welded, that apparently had not been regarded as sufficient to produce the required degree of water-tightness, and the joints had been filled with injected red lead. Under such circumstances, the machining of the flanges over their full width of 6-in. appeared to be unnecessary. Were the flange-joints vee-welded? If so, how were the vees cut? Notwithstanding its complexity and cost, the joint as a whole did not compare favourably with the much simpler caulked-lead one used in the pipe-subway, especially in view of the effect likely to be produced on the welding by any movement of the lining as a whole. It would be interesting to know why there was such a marked difference between the jointing of the tunnel-lining and that of the pipe-subway, both being subject to approximately the same hydrostatic pressure. Did the tolerance of 1/64-in. apply to the subway segments, as well as to those of the tunnels? The use of neat cement for grouting outside the tunnel-lining instead of the usual 2:1 mixture seemed somewhat extravagant for such a purpose.

With reference to the cutting away of a portion of the thickness of the roofs of the tunnels, the figure of 1 cubic yard as an average week's work of a diver seemed low, even allowing for 33% of delays. Mention was made (p. 143†) of an experiment with a " hydraulic cartridge " for breaking up the concrete. Some years ago, the ashlar masonry sill of a dock-passage at Grimsby had been lowered to the extent of 4-ft. by drilling holes into which specially-designed hydraulic jacks were lowered. By those means a portion of the masonry had been burst off, and by a repetition of the process the whole sill had been lowered. The operation appeared to have been very successful, but concrete was different in character from ashlar stone. Would the Author give some indication of how the concrete behaved when tested, and why the method was regarded as a failure? Did the term " hydraulic cartridge " refer to jack such as that used in the above-mentioned work at Grimsby? The puncture of the roof of one of the pipe-culverts by the rock-breaker, and the sticking of the ram in the brickwork, was an awkward occurrence in the passageway of a busy dock. The extraction of the ram was an example of the great value of a powerful floating-crane as a general-utility tool, adaptable to a wide range of emergency operations.

It might be thought that in a dock 3 miles long it would be advantageous to have a deep-water entrance at the up-river end, for the service of vessels using the Royal Victoria basin; the advantage was, however, more apparent than real, since for both entering and leaving vessels the use of such an entrance would involve turning in the river—not a desirable procedure—and an appreciably increased length of course. On the other hand, travelling in the dock probably involved fewer navigation risks, from traffic, currents, etc., than did a corresponding distance on the river.

Mr. E. Fletcher Roberts, of Dunedin, commenting on the Author's statement (p. 140†) that " Owing to the very flinty nature of the concrete of the old wall the cutting away to form a continuous bearing for the deck and dovetailed pockets for the anchor-beams proved a difficult operation," drew attention to similar trouble which had been experienced during the construction (in 1914) of the crane track referred to on p. 139†. Dovetailed pockets had been cut for the ends of " raking struts " connecting the crane conduit with the quay wall at 15-ft. centres. That work, being executed at that time entirely by hand, had proved so very troublesome that after a certain number of struts had been installed it had been decided to omit that detail of construction; 4-in. diameter holes for draining the conduit had been drilled through the quay wall at 90-ft. centres, and those, too, had proved very troublesome. A small pilot hole had first been put through and subsequently enlarged by a second drill, but with hand methods the work had been very slow and irritating.

*Published in the March, April, May and June, 1939 issues of this Journal and reproduced by kind permission of The Institution of Civil Engineers.

†Page numbers so marked refer to "The Dock and Harbour Authority" [*see footnote above].

Improvements at the Royal Docks, Port of London Authority—continued

Some details of the method of design of the 24-in. by 12-in. concrete sheet-piles, referred to on p. 168†, would be appreciated.

Mr. Roberts also noted, with interest, that the use of a conduit with live wires and plough for feeding the electric cranes had apparently been abandoned in favour of trailing cables, and he would be interested to know how long the conduit and ploughs installed on the north quay of the Albert Dock in 1914 had been used.

The Author, in reply, observed that he was obliged to Mr. Mitchell for drawing attention to the error in Fig. 8 (p. 142†), where the boltholes were described as cored. That had been the original intention, but subsequently it was decided to drill both the holes and the counter-sinking. The Author was inclined to agree with Mr. Mitchell's criticism of the use of lead grummets and counter-sunk holes, and with his suggestion that a simpler joint, such as rings of red-leaded canvas, should be considered. The machining of the flanges was an important factor in ensuring the accuracy of the lining, and with the seam-welding of the flush joints it produced a watertight job. The red-lead pump was used for testing the joints, but it was only necessary to inject the red lead into a few of the joints near the taper segments. The simpler caulked joint of the pipe-subway had been adopted because the subway had 13-ft. of virgin cover, as compared with about 18-in. of brickwork over the railway tunnels.

The " hydraulic cartridge " referred to was really a jack, and was effective in bursting concrete, but the trials had not produced any uniformity in the depths of the cracks.

Mr. Fletcher Roberts, until he had joined H.M. Forces, had been engaged on the construction by departmental labour of the Albert Dock crane-track and reinforced-concrete conduit, with its collapsible forms. In spite of precautions the plough-slot had gradually closed in, until in 1928 the ploughs had been abandoned in favour of trailing cables plugged into switch boxes, which were formed at the side of the conduit of 50-ft. centres. The live cables in the conduit had since been replaced by one twin-core 0.5 sq. inch paper-insulated, lead-covered, armoured-type 1,000-volt cable. The 24-in. by 12-in. concrete sheet-piles were reinforced with six steel rods each 1 5/16-in. diameter at 10-in. centres, ½-in. cast-iron spreaders at 5-ft. centres, and ½-in. binders in pairs at 6-in. centres in the body of the pile.

Port of Singapore

Excerpts from the Annual Report of the Harbour Board for the Year ended 30th June, 1939

After providing for Interest and Sinking Fund Contributions in the sum of $1,645,745.51 the Income and Expenditure Account shows a surplus of $1,292,556.76 as compared with a surplus of $2,364,557.61 last year.

Of the total expenditure for the year as shown in the Income and Expenditure Account, amounting to $7,646,896.38 the amount of $1,974,930.83 or 26% is uncontrollable by the Board, being Interest and Sinking Fund Contributions, Municipal Assessment and Audit Fees.

Wharf Department.—The number of vessels berthed at the wharves during the year under review was 3,121 with a total net registered tonnage of 9,793,293 tons, compared with 3,231 vessels totalling 9,756,410 tons during the previous twelve months.

General.—The trade handled at the wharves during the year was, in the aggregate 3,209,327 tons or 5% less than that for the previous year. General cargo inward decreased by 92,861 tons or 7%, whilst general cargo outward decreased by 50,234 tons or 4%. The average percentage of quayage occupied during the year was 59% as compared with 70% for the previous year.

The pontoon for the floating bunkering unit of the mechanical bunkering plant was launched at the Board's dockyard on the 25th March, 1939, and the contractors are proceeding with the erection of both the floating and land coal handling plants.

The reconstruction of the East Wharf was commenced in April, 1939, and progress has been made with the westward section of the new reinforced concrete wharf. The question of providing additional dry dock and wharfage accommodation at Keppel Harbour is still receiving consideration. The reconstruction of the King's Dock Wharf was completed on the 7th April, 1939, and is proving a valuable addition to the dockyard wharfage facilities.

Mr. H. K. Rodgers, the Board's Assistant General Manager, was appointed Chairman, Harbour Boards, Singapore and Penang, in succession to Sir George Trimmer on the 29th July, 1939.

Tees Conservancy Commission

At a meeting of the Tees Conservancy Commission on December 4th when the annual report and accounts for the year ended October 30th, 1939, were submitted for approval, Sir Francis Samuelson, chairman of the Commission, who presided, said there was no doubt their operations during the current year would result in a deficit. The extent of the deficit would depend upon the volume of trade using the port, and under prevailing conditions it was most difficult to arrive at any estimate of the deficit likely to be experienced. Commenting upon the past year, the chairman said there was in the early part of the period a strong improvement in almost every branch of commercial and industrial activity. Unemployment fell, iron and steel production expanded to practically maximum pressure to meet Government contracts, and there was a large commercial demand. All sections of engineering were also busy.

The Government scheme for assistance to shipping and shipbuilding was reflected in the demand for new tonnage, and they had been hopeful that by the end of the year their anticipations of a deficit on the year would turn out to be a surplus. With the outbreak of war, the temporary dislocation of shipping caused a heavy fall in income. Without this setback there would have been a better result, relatively satisfactory as it is.

The accounts presented showed a surplus of £363, a decrease of £14,444 on the previous year, due to a fall in revenue of £12,176, and an increase in expenditure of £2,268. The total income, including £8,812 from investments, amounted to £138,337, compared with £150,514 in the previous year. River dues and tolls were down to £11,644, due to the decline in imports and exports. On the expenditure side dredging costs were down £2,125, and the quantity raised decreased by 308,504 cubic yards, owing to interruption of normal dredging. Maintenance costs had risen through increased prices, wages advances, and heavy weather conditions in the winter months. Considerable expenditure has been incurred for air raid precautions. Capital expenditure during the year amounted to £14,581, and the invested funds of the Commission are shown in the balance sheet at £278,707.

Estimate of Revenue

Sir William Crosthwaite, referring to the estimate of revenue of £80,000 from dues during the current year, pointed out that office expenses represented 3½%, and salaries 16% of this income. He urged the necessity for reducing these costs, pointing out that income in September was £7,300, in October £6,700, and in November £5,800. The estimated income was steadily decreasing, and, on the basis of November, would be £72,000, not £80,000. Sir William declared that he could not share the optimism displayed in the estimate of revenue submitted. Expenses must be reduced.

Alderman J. Wesley Brown, chairman of the Finance Committee, replying, said every possible avenue of economy would be explored. The estimate of revenue was reached after very careful consideration. No one knew what the future would hold and it might prove more satisfactory than the rather pessimistic view of Sir William. If the estimate were correct, by October next year they would have depleted their resources by £96,000, but fortunately they had accumulated resources and would be able to meet all their obligations.

The report and accounts were adopted on the motion of the chairman.

Increase in Port of London Rates

Rates and charges in the Port of London have been increased by 7½ per cent. as from December 4th, with appropriate increases in rates and charges which are subject to percentage increases.

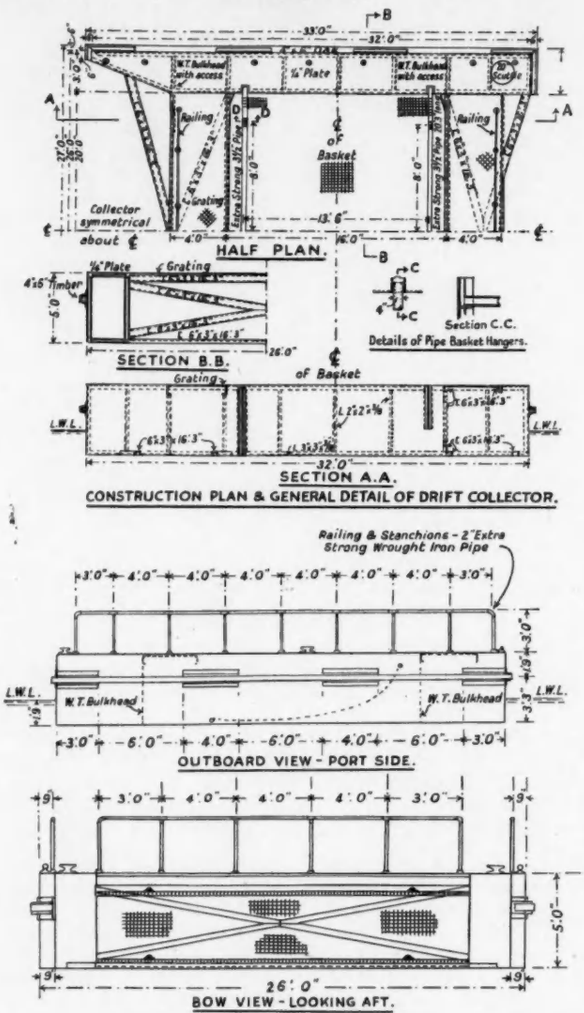
An official notice, dated November 29th, issued by the Port of London Authority, shows that the increase of 7½ per cent. will apply to river dues on tonnage on vessels; Surrey Canal tolls and charges; port rates on goods; and navigation tolls for vessels carrying merchandise westward of London Bridge. In the case of rates and charges (including rent) on import goods; on goods for shipment; on shipping using the Authority's docks; for discharging vessels and other services shown in the Shipping Schedule (other than the supply of tugs, towage of craft and barges, and the supply of water, electricity and gas); for the use of dry docks and appliances; and for the use of oil separator barges there will be an increase of 7½ per cent. where present rates and charges are net figures where these are subject to percentage increases the revised percentage increases show an addition of 7½. For example, a present addition of 2½ per cent. is to be increased to 10 per cent.; 5 per cent. to 12½ per cent., etc.

The London Association of Public Wharfingers, Ltd., have made similar increases to those announced by the P.L.A. as from December 4th in respect of rates and charges on import goods; on goods for shipment; for discharging vessels and other services.

Harbour Drift Material

Novel Apparatus for dealing with Flotsam and Jetsam

A recent issue of " World Ports " contains an informative article by Mr. J. Gelberman, who is in charge of floating plant and drift collection at the Port of New York, showing how the problem of drift material is dealt with in the United States. As a matter of general interest, we have pleasure in reproducing the article with due acknowledgments.



Driftwood, a word that to the layman conjures up visions of a beach along uninhabited shores. Huge trees once uprooted by winds of hurricane velocity, thrown upon the shore, there to be lashed by the breakers, the rain and the flying sand until the skeletons of once proud monarchs of the forest lie bare of bark and foliage with branches thrust into air like bleached ribs of great prehistoric monsters. Scattered about the giant bole of one of the trees are the remains of the deck and the bowsprit of a sailing vessel torn asunder in the storm-tossed sea.

Of course, that is driftwood, but in the greatest harbour in the world only 1% can be attributed to these sources. The other 99% is not nearly so aesthetic.

Egg crates marked " New Jersey's Best," meat crates marked " Salt Pork," crates marked " Salt Herring," barrels, cases, cartons, not very romantic, but they contribute about 15% of the total. Perhaps the greatest contributors are the broken down piers and wharfs which are fast disappearing, due to the vast road construction programmes now under way along the metropolitan waterfront. However, the projects themselves are offenders, since the construction work, in turn, is the next important contributor to the drift problem. Next in importance are the sunken wrecks of barges and scows, pieces of which reach the surface when torn loose by storms and strong tidal action. All types of drift, which range in size from pieces of orange and egg crates to timbers, 60-ft. long, constitute menaces to navigation and health.

The people of Greater New York, many thousands strong, venture forth in small vessels of every description, during the summer months. Huge liners, small and large freighters, tows of lumber, coal, craft of all sizes and capacity, ply the waters of the bays, rivers and sounds of New York. Anyone familiar with water craft can readily understand the many dangers that the presence of drift can evoke. What chance has the small pleasure craft that might strike a submerged or partly submerged piling 18-in. in diameter? How easily a great transport, that is unfortunate enough to get a 12-in. by 12-in. fouled in its propeller, can be disabled. How dangerous to the swimmer is a plank studded with 60 D. nails!

Although drift is always present in the waters of Greater New York, the summer season is always the worst. The small boy, who throws the stick into the bay for his dog to retrieve, is a contributor. The thoughtless picnicker who leaves the broken chair, is a contributor. The countless thousands, who repair their boats in the spring, are contributors. Moot evidence of the correctness of the above can be seen in contents of the drift streak which can be found coming up the bay on the flood tide and returning on the ebb.

One will, of course, ask at this point " What is being done about it? "

One of the year-round activities of the U.S. Engineers is the collection of this drift. A fleet of lighters work constantly at the full-time job. The drift removed each year is enormous—hundreds of thousands of cubic feet. Methods for the collecting of the drift have been steadily improved. Personnel is highly efficient and very apt in this hazardous undertaking.

Very recently there has been an addition to the plant engaged in the work, the " Drift Collector." Conceived and designed by the personnel of the U.S. Engineer Department and built in the Brooklyn plant of the J. K. Welding Co. in 1938, at a cost of only $4,300, it is a very simple and effective collector of drift. Consisting in the main of two pontoons, between which is supported a net, it has on test loads collected six tons of drift in one load working in the afore-mentioned drift streak.

The method of operation is very simple. Taken in tow by one of 3-derrick lighters available, it is directed toward the drift which passes into the net. When the net is filled, the lighter picks up the net and places it on its own cargo deck. A new net is then inserted and the work continued. In this manner, 50 tons of drift can be removed before it is necessary to take it to the point of disposal. The U.S. Engineers have found this to be a very satisfactory method of collecting, and will, in the future, build additional collectors.

There is at the present time, however, a very definite problem which must be solved, and that is what is to be done with the tremendous amount of drift that can be collected. While the sources of drift have increased in the past twenty years, the possible points of disposal have decreased. What were once isolated beaches, where the drift might have been burned, now are occupied by summer colonies, piers for huge liners, yacht clubs, bathing beaches, etc. Once it could be stored by people for use in the winter, but to-day there is no room in two and three-room flats for storing wood. The huge coal and oil-burning central heating plants take care of apartments and industry. War-time manufacturers of potash were interested in drift. Then potash was worth $400 a ton, but at $30 a ton for potash to-day, driftwood is not interesting. Thus, the disposal is a definite problem, but one on which the U.S. Engineers are working and which will be solved.

The methods used in the collection of drift in New York Harbour might prove of interest to other harbours that have similar problems. The unique drift collector, which would prove practical in all size ranges, is available to all who might care to utilise it. The derrick lighters are more or less of the standard type. They are normally from 100-ft. to 125-ft. in length, are equipped with derricks of from 12 to 20-ton capacity, and are further equipped with powerful capstans utilised in the breaking up of wrecks. Big drift is pulled out by means of the derrick, but smaller drift is speared with pike poles by the deck hands and lifted up on deck.

The engineers have one lighter that constantly patrols the waters of Flushing Bay and the Harlem River, one that patrols the upper and lower bays and one that patrols the North and East Rivers. They are on call at all hours to cope with the drift situation. Boats must safely ply the waters of the rivers and sounds, bathers must be protected, liners must proceed with safety and on time. It is not a small job, but a big full-time job which requires co-operation from everyone concerned.

Improvement of Clyde Channel.

A Provisional Order has been promoted by the Clyde Lighthouses Trust in which authority is sought to alter, deepen and widen part of the navigable channel of the River Clyde. It is proposed to carry out the work at a part of the channel-way between Newark Castle, at the east end of Port-Glasgow, and a point 350 yards or thereabouts from the outer north-western end of Prince's Pier, Greenock. The distance involved is between three and four miles. This is the main provision of the Order, and other sections seek to repeal various Acts and to re-enact and consolidate the powers and provisions of the repealed Acts or some of them.

Mersey Docks and Harbour Board

Chairman's Annual Statement

At the meeting of the Mersey Docks and Harbour Board on November 30th, the Chairman, Sir Richard D. Holt, made his annual statement on the work of the Board for the administrative year which ended on June 30th. In the course of his remarks he said that the members now had before them the accounts for the year ending July 1st, 1939, a date two months before the outbreak of war. Though the period under review was full of anxiety the work at the docks during the year could justly be considered as not affected by the calamity which had fallen upon the whole world. The accounts showed that the trade of the port was in a satisfactory condition. The total tonnage coming to the Mersey was slightly below last year's record figure of 22,097,755 tons, but the tonnage entering the docks rose by 78,000 tons to 16,608,819 tons and constituted a record for the Port of Liverpool. Compared with the year ending July 1st, 1933, the total trade of the Mersey had increased from 18,758,839 tons to 21,724,050 tons, approximately 16 per cent., while the coasting trade, including the cross-channel traffic to Ireland, had increased from 3,657,133 tons to 4,515,601 tons, an increase of approximately 23 per cent. The revenue showed a slight falling off and the expenditure a slight increase, but after making full provision for their sinking fund and other necessary allocations they were able to transfer £115,675 to the unappropriated receipts account. That account now has a credit balance of £384,501, which may be very useful.

During the year the estate has been kept in good repair but no new work of any importance had been brought into commission. The new entrance to the Waterloo dock was making good progress at the rate anticipated. The sea channels had been well maintained and the training banks continued in accordance with the approved scheme, which showed every sign of producing the anticipated result. The work had been discontinued since the outbreak of war, but the channels would be maintained in good navigable condition.

Until the end of August, the trade of the port was going on as in the previous year, and a slight improvement on the two corresponding months of 1938 was obtained. Since that date business had changed much and considerable increases in expenditure had become unavoidable. They must anticipate a rise rather than a fall in the rate of interest to be paid on their bonds, and while every effort would be made to run the port economically, increased charges would be necessary.

At the same meeting the Board confirmed the amendment of a bye law with respect to master porters' rates, the effect of which was an addition of 16 per cent. in lieu of the present 12 per cent. to the master porters' charges. The increase was recommended by the Board's assessors.

Publications Received

Handbooks on Home-grown and Empire Timbers.

The Forest Products Research Laboratory of the Department of Scientific and Industrial Research has just issued two publications of interest and value at the present time. The first is a revised edition of the handbook on Home-grown Timbers (published H.M. Stationery Office, 2s. net); the second is a companion volume dealing with Empire Timbers (Handbook of Empire Timbers, published H.M. Stationery Office, 3s. 6d. net). This latter volume contains a large amount of new information on the increasing number of Empire timbers offered in the home market which has become available since the publication of a handbook with a similar title by the Empire Marketing Board in 1932.

Both volumes are planned along the same lines. The volume on Home-grown Timbers covers some 35 species, viz. 26 hardwoods and 9 softwoods, while that on Empire Timbers covers 79 hardwoods and 17 softwoods. The sections devoted to each species contain descriptions of the tree and its timber, and include notes on its seasoning and mechanical properties, its suitability for bending, its wood-working properties, its natural durability and resistance to insect attack, and preservative treatment. Other paragraphs contain information on the most suitable uses of the various species of timber and their main sources of supply. Where possible reliable shrinkage figures are cited for each species, while particulars of kiln seasoning schedules and figures for mechanical strength are provided as appendices to each volume.

In considering strength properties of timbers it is stated:—

"Although, within very broad limits, most strength properties increase with the density of the species, there may be marked differences in specific properties between timbers of the same weight. Thus, home-grown ash has about the same weight and bending strength as beech but has an energy-absorbing capacity 50 per cent. higher than that of that timber. For use as a beam, these two timbers are equally strong, but where suitability for, say, hockey sticks, is in question, ash is, by virtue of this higher capacity for absorption of energy, definitely superior to beech. This example, which might be multiplied many times, illustrates the importance, when comparing timbers, of taking into account the uses to which they are to be put and the specific strength properties relevant to these uses."

The notes on general woodworking qualities of the timbers described are based on the behaviour of normal air-dried material with a moisture content of 15-18 per cent. Information is given on planing and on the most suitable types of saw to be used. Details of the saw types mentioned under each timber are given in a third appendix.

An explanatory introduction to each volume assists the reader to interpret the data correctly and to make a ready comparison between one timber and another.

Annual Report on the Social and Economic Progress of the People of Johore, 1938.

The Annual Colonial Report (published by His Majesty's Stationery Office, price 1s. 6d. net, postage extra) on the State of Johore, in the Malay Peninsula, contains much interesting information of a general character regarding the Geography (with coloured map), Government, Population, Health, Housing, Natural Resources, Commerce, Labour, Wages, Education, Communication and Transport, Public Works, Justice and Police, Legislation, Banking, Public Finance and Taxation of the State. The most interesting section from the point of view of this Journal is that on Communications and Transport, which is reproduced below.

Communications and Transport

On the west coast, Johore is served by Muar, Batu Pahat and several smaller ports—Pontian, Benut and Sengarang. Local steamers from Singapore visit all the smaller ports but, like the railway, have suffered from the competition of road transport.

On the east coast the north-east monsoon has created bars that make the estuaries accessible only to small steamers and Mersing is the only port at which even these call, but the loading of iron ore brings ocean-going steamers to Endau which lie out some distance from the coast.

There are steamships running from Singapore to Pengerang, Tanjong Surat and Kota Tinggi on the Johore River and also to Sungai Papan. Motor-boats ply for hire on most of the navigable rivers.

The total number and tonnage of vessels entered and cleared at all the ports was as follows:—

	Entered		Cleared	
	Number	Tonnage	Number	Tonnage
Ocean-going Steamers ...	79	595,860	79	595,860
Coasting Steamers ...	3,566	119,149	3,566	119,149
Sailing vessels ...	10,226	249,380	9,754	236,453

These figures show an increase of 295,002 tons entered and 276,390 cleared as compared with 1937. The number of passengers arriving and departing from the ports in the State was 21,019 and 17,683 respectively against 24,350 and 19,565 in 1937. Of the ocean-going steamers, 50 were Japanese, 7 Chinese, 2 British, 2 Greek and 12 Norwegian. Fifty-seven of them called at Batu Pahat to load iron ore and Bauxite, and the remaining 22 called at Endau for iron ore.

The total tonnage of the sea-borne trade for the last five years was:—

Year	Ocean-going Vessels Tons	Sailing Vessels Tons	Coasting Steamers Tons	Total Tons
1934	263,459	234,219	121,792	619,470
1935	296,754	240,549	103,651	640,954
1936	277,700	249,307	103,547	630,554
1937	286,810	252,170	136,092	675,072
1938	595,860	236,453	119,149	951,462

Tongan Island Harbours.

The Annual Colonial Report for 1938 on the Tongan Island Protectorate issued by H.M. Stationery Office (Price 6d.) shows that the total tonnage of vessels entered and cleared at the two ports of entry in the group during the year amounted to 115,472. Nearly two-thirds of these were British. A regular four-weekly cargo service was maintained between Nukualofa, the chief town and port and Auckland, New Zealand. Seven vessels (one Dutch and six Swedish) visited the Protectorate for cargoes of copra. The following table gives the trading statistics for the last five years:—

	Total Imports £	Domestic Exports £	Re-Exports £
1934 ...	48,526	68,569	1,436
1935 ...	68,782	89,092	819
1936 ...	92,296	113,755	899
1937 ...	137,365	162,931	1,690
1938 ...	82,795	96,803	1,633

THE DOCK AND HARBOUR AUTHORITIES' DIRECTORY

THE PUBLISHERS regret that owing to the outbreak of hostilities and the resulting difficulty in obtaining from abroad full details of the names of Members and Principal Officers of Dock and Harbour Authorities, it has become necessary to temporarily discontinue publication.